CUSTOMARY ACRES

AND THEIR HISTORICAL IMPORTANCE

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BEING

A SERIES OF UNFINISHED ESSAYS

BY THE LATE

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PREFACE.

In publishing these unfinished studies of my father's it is my duty as well as my desire to state clearly, to anyone into whose hands this book may come, that I am responsible for its publication, not he. His standard of workmanship was so high that had he lived to go on with this work, its final form would have been very different. Realising that he would not be able to complete his inquiry, he devoted his time—working sometimes even in his bed—to grouping the subject into sections. He also drafted an introductory chapter to indicate its scope and to suggest the directions in which he thought it might be followed up.

In all his work my father looked forward to the probability that other scholars with other evidence would amplify and modify his results, and with this in his mind he liked to consider his books as ' essays ' or ' contributions ' towards the solution of the questions he dealt with.

In this particular work, he was conscious that his material had led him away from the original purpose he had set out with, into a far wider field of prehistorical inquiry. But he had not time to remodel his notes to accord with a new point of view.

Starting with his old theme of the Economic History

of the Village Community, his idea was to investigate
further the relation of the 'shell' (as he called it),
i.e. the actual division of the land on the ground,
to the institutions that governed it. He had traced
the Open Field System in England in its relation to
the English Village Community. He found the same
open fields *still existing* in France, obstructing indivi-
dual enterprise and trammelling the development of
agriculture. In continuing his long chain of studies
he set himself to inquire whether a closer examina-
tion of this shell, and of its modifications, would not
throw light upon the one thing that interested him
before all, viz. the gradual economic growth of the
communities that inhabited it.

Hence the dry bones of Metrology, the length
and breadth of the acres on the surface of the ground,
became alive for him. But working at the customary
acres, he found that what was conspicuous about them
was not so much their relation to local customs as
their relations to each other and to other land-measures
in an ever-widening circle throughout Europe. Follow-
ing this evidence he could not help feeling that, if there
was anything at all in the remarkable results he obtained,
they might have a value for students in a different
field and might shed some side light upon the early
movements of peoples in Western Europe.

If it is true that in the seventeenth century, nearly
all over England, the milestones of England still denoted
the distances in the Old British Mile ; if this Old British
Mile is the same as the Gallic Leuga which the Romans
found existing in Gaul when they first conquered it ;

if the relation of the furrows of the customary acres
to the mile or itinerary measure is as ancient as it
appears to be universal; then we seem to be taken
back 2000 years at a stride into an intricate network
of intertribal or international relations.

The acre, or unit of land measurement whatever
it was called, was not merely a means of stating the
area of a piece of land : it was a unit of *cultivation*
and had its shape determined for it by the actual
convenience of the plough. In wheat-growing plains
where the eight-oxen plough was in use, a long furrow
was a necessity, the width of the strip proportionately
lessening. Further South and East where the single
yoke of oxen was usual, the shape was often square or
two squares side by side. In the typical village of
Britain or Northern France the land lay round the
village, as described in Piers the Plowman and as shown
in the maps before the Enclosures (see map facing
p. 123), divided into as convenient strips as possible.
Just as a ploughman now will know very nearly how
the land he is ploughing in a field divides into acres, so
in the old open fields it would be well known how far
each strip corresponded to the typical customary acre
or a part of it. When the villagers came out to play
on the stubbles, it was easy for them to choose an acre-
strip to throw their ball across from balk to balk. The
exact width of the statute acre—twenty-two yards—
is now the cricket pitch. For practice with the long-
bow, Henry VIII decreed that the shortest butts
should be a furlong—eleven score—or exactly the
acre's length. The stade was a furrow before it was

a footrace; and the length of the furrow and back again still survives with us as a standard race in the quarter mile.

The serious work of agriculture was the life of the people, only interrupted by war. Cæsar had to subordinate his campaigns to the growing of corn, and Alfred found that his levies melted away from his standard whenever their fields called them. If the shell in which, year by year, this vital process took place can take us back 2000 years, to whom does it belong and at what period did it become crystallised? These are questions rather for the ethnologist; there is no attempt to deal with them in these pages. But they are questions that will arise in the mind of the student in proportion to the light he may be able to bring from other lines of study to the material here tentatively set before him.

Although my father shrank from the thought of these his unfinished studies being published, he left it entirely to my discretion to deal with them. I believe it to be quite fair to his memory as well as in accordance with his wish that they should be put, just as they are, within reach of any student of History whose purpose they may serve. I am sure they will not be misjudged.

HUGH E. SEEBOHM.

POYNDERS END,
    HITCHIN.

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INTRODUCTORY CHAPTER TO LIMIT THE SCOPE OF THE INQUIRY.

I AM fully aware of the dangers involved in an attempt to follow a line of historical inquiry on a single branch of a complicated problem into a *stratum* of facts underlying that of ordinary history.

But ever since I came to realise the importance in Economic History of tribal landholding and its development into the open field system of the village community, I have felt more and more the necessity of a deeper study of both and of the transition from the one to the other, if we are to understand the line of economic development in Western Europe.

I have been driven to recognise how the open field system of the village community acted as the *shell* under cover of which the common village life of an agricultural people was kept alive through the period of anarchy which followed upon the break-up of the Roman Empire, the almost breathless succession of Teutonic invasions and the internecine wars between the invading tribes. In the first volume of my series of economic studies I tried to point out how the open field system of the English village community was intimately connected with British Economic History and the growth of the manorial system during the later period. But it enters also (far more than I think has yet been acknowledged)

into the wider question of the economic development
and evolution of human society in Europe.

The secret of the economic strength of the open field
system in the organised form taken by it in Britain is
not far to seek.

The holding of the individual peasant was so inter-
twined and intermixed with those of his neighbours
that he was incapable of independent action. As his
yardland or virgate consisted normally of 30 acre strips
or sometimes twice as many *half-acre* strips scattered
over the common fields he could not cultivate his strips
as he liked. He was bound to follow the course of
husbandry prescribed by the community whether on
the two-field or the three-field course of rotation of
crops and fallow. Even when the corn crop was
removed, the strips of the peasant were not at his own
disposal. Everyone's strips all alike on a given day
became common pasture for the herds and flocks of
the whole community under the care of the common
herdsman or shepherd.

But it was not a specially British institution.
Practically the same advanced type of open field system
was common to the corn-growing districts of Britain and
Gaul. Indeed, to get a full and vivid sense of the
economic and social power and grip of the system, the
English student must go to the great corn-growing
regions of France and look down upon its vast open
fields from the Cathedral towers of Chartres or
Amiens.

Nor may one reasonably be afraid to recognise how
deeply it entered into the tissue of domestic and com-
munal life—how the religious and poetic feeling of the
people for ages, probably from the days of the

Druids, and certainly through the Christian centuries, were influenced by it. The temple and the church became visibly its centre. One may safely recognise with Ruskin how the sculptures on the great doorways of Amiens Cathedral indicate that it was built for an agricultural community. One may learn from Millet's 'Angelus' what a part the church bell plays in the economy of the open field, and see, too, in the 'Shepherdess' of the same peasant-painter how solemn a responsibility is involved in the task of leading the communal flock in the exercise of the *vaine pâture* by night as by day so as to secure that every one's strips get their fair share of the droppings of the sheep by which the stubble of the common field is manured.

I have walked over the common fields both of Amiens and Chartres. On the latter a peasant was found planting vines on one of his strips near the town. When reminded of the *vaine pâture* and the injury it would do to his vines, he shrugged his shoulders. They must run the risk of that ! He dare not enclose his strip. Even to this day the individual peasant holder is bound by the strong grip of custom. To defy the immemorial rules of his commune might be to bring down his house over his head.

Nor could one gain anywhere in Britain so vivid a picture of open field husbandry as one gets from the height above the old Roman town of Andernach, looking down upon the flat plain bounded by the wide sweep of the Rhine and stretching away into the far distance like a great map. Or going farther into the heart of Central Europe the same may be said of the view from the tower of Ulm Cathedral over the rich

Bavarian corn-fields. Under modern legislation and industrial advance the rigid rules of the system may be gradually relaxed, but over a large part of Continental Europe in French, German, and Slavonic countries it is still more or less a living system, whilst in England we have to look back to the tithe maps of a century ago and those made for the very purpose of destroying it by enclosure. It is fast fading away out of memory. Still, even in England, the system has in many places left indelible marks on the ground which will remain for centuries longer, and perhaps for ever, to tell of its existence in the past. From the railroad between Cambridge and Oxford, passing through tracts of country now all but entirely devoted to pasture, the marks of the once arable strips remain as clearly defined as on a map. The ancient habit in some districts such as these, of ploughing each strip into what was called a high-backed land gave a permanence to its boundaries which nothing but a re-ploughing of the land can ever efface. Especially remarkable instances of this may be seen in the case of many of the manors around Worcester, which for more than a century have been altogether pasture and which yet retain the marks of the old ploughing and the division into strips as clearly defined as in the maps made before the enclosures of the eighteenth century, and still preserved in the Cathedral Library along with the manor rolls, going back sometimes to the thirteenth and fourteenth centuries. In these rolls are recorded the changes of the holders of the yardlands generation after generation. And the fact is unexpected and striking that in the schedules of holders attached to the eighteenth century maps, made just before the enclosure, the holdings are

still called 'yardlands.' So that while these maps
bear witness to the persistence of the holdings, in yard-
lands, of scattered strips until the enclosure put a
sudden end to the system, the marks of the strips them-
selves will remain practically for ever to bear witness
to future generations that the open field system once
and for ages was the prevalent system of agriculture of
the English village community under the ecclesiastical
manorial lords of the Severn valley. But when we speak
of the particular form of the open field system connected
with the village community we must not forget that
there were various other forms of it.

In Britain, as already said, there have been all along
two prominent forms of it. Side by side with the village
system of parts of England mainly agricultural we have
to recognise the tribal form of it fully in force in Wales
under tenth century customary rules, described incident-
ally rather than as newly enacted in the Venedotian
Code. What they amount to is this. Though the
tribesmen were mainly engaged in pastoral life a certain
amount of corn was a necessity even to them. So far
as land was concerned their rights were family rights
and sometimes joint and undivided shares with others
in rights of pasture ; but the occupants of a pastoral
community are represented as contributing oxen to a
common plough-team and each year ploughing up by
common consent enough for the coming year's crop.
The common plough with its team of 8 oxen under this
system of co-aration ploughed each year the required
number of strips or erws, each strip being a day's work
of the plough, a *cyvar* or co-ploughing, and the strips
are described as taken by the individual contributors
to the plough-team in the same order of rotation as their

oxen might stand in the team.   Finally, after the crop
was gathered, the strips of the year's ploughing went
back into the common pasture.   Such is the description
in the Venedotian Code of North Wales as prevalent in
Howell's time.   Here obviously in this co-aration of the
waste is an embryo form of the more advanced open
field system of the settled agricultural village com-
munity.   It is only necessary to extend the corn crop
over a wider area and to subject the strips to a perma-
nent rotation of crops, and the result would be holdings
with scattered and intermixed strips and the *vaine
pâture* over the stubble.   In Britain the 8-oxen plough-
team, entering as it did through the carucate and the
hide into the structures of the manorial system, forms
a connecting link pointing strongly to the long-continued
existence side by side of tribal and more or less settled
agricultural life such as the testimony of Cæsar, and
of Pytheas, centuries earlier than Cæsar, might well
prepare us to expect.

It is not difficult to conceive of the process from
tribal and mainly pastoral life to that of the agricultural
village as population increased and the single plough
was no longer all that was required.   But the transi-
tion was not always so easily accomplished.   The
constitution of the tribal family unit of the gwely did
not readily adapt itself to the system of regular holdings,
in yardlands normally representing the contribution
of the single yoke of 2 oxen to the plough-team of 8.
The right of each tribesman to maintenance was not
easily shifted from an allotment of cattle with common
rights of grazing to a definite holding like the yardland.
The evidence of both Irish and Welsh history show
that some power from outside following upon conquest

and followed by something like lordship was needful to consolidate the village community into the permanent form in which we find it and which enabled it to hold its own apparently unchanged through countless generations.

Now if the open field system with its network of scattered strips or acres under the grip of tribal or communal instinct was strong enough to preserve from destruction during ages of anarchy the village life of the agricultural population, let us say of Britain and Armorican Gaul, what shall be said of the *customary acres* of which, so to speak, the intermixed network of strips consisted ? In spite of their division only by unploughed turf balks, must they not have shared in the permanence resulting from the same tenacity of custom which kept the system itself alive ? Shall we not learn to trust their evidence also when we find them holding their own from a far back traditional origin lost in the past ? There is no doubt that the lie of the land and the character of the soil must have had something to do with their form and size—in any particular field. But if it can be shown that the British customary acres, which in spite of legislation have lingered in particular districts on this side of the Channel, form a normal group coinciding with a corresponding group on the other side of the Channel similar in area and in the form of 1×10, like those in England, these customary acres will take a place of new interest in economic inquiry. It may be possible with more or less success to follow them back to the central home from which the Celtic tribes or possibly earlier immigrants wandered into the western extremities of Europe bringing with them as a part of their racial

possession whatever of civilisation they had already attained to, whether derived from a still earlier home, or gathered, since their settlement in Central Europe, from the agricultural methods of the great corn-growing regions of the nearer or farther East.

Such an inquiry cautiously and sanely conducted and confined strictly to the facts bearing upon it ought not, I think, to be unproductive. It may possibly lead us along unexpected paths, but if pursued with caution it ought not to lead us astray.

If this evidence of customary acres stood alone I confess that, remarkable as it always must be, it would not bear the full weight of the inference which I am seeking to draw from it. But it does not stand alone. Through its connection with the open field system of agriculture it becomes involved in the system of tribal tribute and food-rents which become at last the basis of medieval taxation.

The methods of tribute to the chieftain under tribal custom in Wales becomes at once closely connected with the plough, even in the shape of co-aration of the waste. The nature and meaning of the tribal systems of tribute become thus important elements in economic history, and though to trace with any fulness the passage of the ' *firma unius noctis* ' of the tribal chieftain and the still more mysterious *hide* as elements in the natural evolution of land-management and the manorial system in Britain, would lead us beyond the limits of this particular inquiry, yet from the point of view of its object we shall find that these areas of tribal tribute play a part in Britain which brings them strictly within its limits.

They play an important part in the understanding

of the relation of the tribesmen to their chieftain, supplementing our knowledge of the patriarchal relation of the tribesmen in their gwelys to their ancestral head. Even during the tribal period the tribute of the chieftain becomes detached from the tribesmen and charged upon the tref or land of the tribal settlement. It easily becomes so because of the shifting character of the occupants. But the important point is that, even during tribal occupation, the tribute as a charge upon the land becomes a kind of property, sometimes a family property ; for the chieftainship is itself a family inheritance, following the same tribal instinct which ruled in the gwely. The descendants of Cunedda have to be dealt with as members of a Royal House and have their rights to share in the tribute or to take it sometimes in the ' nine nights' entertainment with their retinue and dogs.' So a privileged host of subchieftains or mactigerns become a prominent feature in the actual conditions of later tribal society. And the strange thing is that if we try to follow the course of Wessex and Mercian conquest, whether in the Severn valley or in West Wales, we find amongst the conquerors a similar class of petty kinglets with rights of property and claims resembling those of the petty chieftains of the conquered district. If the early charters of the Severn valley, strictly genuine or not, may be trusted, the Mercian or Wessex petty chieftains could join, and had to join, in the donations to the monasteries because they had rights which had to be surrendered by the grant.

If we turn to the Redon Cartulary and seek to learn the conditions of Breton tribal life we are at first disappointed. The learned Editor seems to get nearly

all his information from the Welsh side of the Channel. We have to face the charters of the eighth century with little previous knowledge. And what do we find? Practically, in a word, a settled agricultural population, the tref under some name or other being still the usual geographical unit and a whole host of mactigerns or petty chieftains in many cases owners of the trefs.

Whilst the main result of this inquiry may be to lead to the recognition of a very ancient and widely extended substratum of common agricultural tradition and methods, there can be no reason why full recognition should not be given to the traces found even in modern customary measures of modifications of earlier custom owing to the influence of colonisation and conquest. Colonisation is indeed a very different thing from conquest. When an organised body of colonists settle in a country they may naturally bring with them their own peculiar methods of agriculture, and, becoming the dominant inhabitants of a limited district, displace the methods of the earlier inhabitants or impose their own methods upon them. We shall find the customary agricultural measures of the Greek colonies in Africa, in Magna Græcia, and in Sicily from this point of view especially instructive. We shall find, too, on the other hand that the evidence of the Roman Agrimensores becomes equally striking in their recognition of agricultural measures, *not their own*, and left undisturbed after Roman conquests even in Italy itself and also in the interesting instance of the Greek colony of Cyrene taken over by the Romans from the last of the Ptolemies. Nor can we rightly shut our eyes

altogether to such influences as may have come along
the routes of commerce, though to enter fully into so
intricate a subject would be beyond the limited scope
of our purpose.

The same may be said with regard to the mass of
archæological evidence pouring in from all sides, which
could not possibly be dealt with even were the writer
competent to deal with it, in a subordinate section of
such a volume as this. This Essay, or series of Essays,
is avowedly limited in its scope. It is but a tentative
attempt to bring together and present for consideration
of the economic student facts relating to one section of
evidence bearing upon a wide and intricate subject
which is obtaining more and more attention, viz. the
gradual growth of Western civilisation regarded from
an economic point of view.

Even should the facts placed before the reader in
this volume leave many problems unsolved, they will, I
venture to think, have done something to emphasise the
importance to the understanding of Economic History,
of the recognition of the existence through the ages of
a substratum of ancient agricultural tradition and
custom embedded in the moral and mental habits of
the peasantry, extending over a wide geographical area,
having its roots it may be in East, but deeply rooted
also in the social and economic life of Central and
Western Europe.

The object of the first section of this volume will
be to show that within the limits of Cymric, Gaelic,
and Brehon tribal custom there was a consistent and
common knowledge and use of *natural measures* both
itinerary and agricultural ; that the areas of tribal

occupation and tribute were closely connected with the ancient itinerary measures common to Gaul and Britain, the Gallic *leuga* of 1500 paces being prevalent in Britain and so deeply rooted in the minds of the British peasantry all over Britain that it held its own in common use till the time of the Tudors and Stuarts and the general introduction of the statute mile.   After examination of the various customary acres prevalent in Britain, in passing to the corresponding group of the great corn-growing district of France, it was necessary to examine, however imperfectly, some of the special features of the Breton open field system with which they were so closely connected.

The result of the examination of the Armorican customary acres will be to show their identity in area with the British acres, accompanied generally with a remarkable change in form, *i.e.* from the British form of 1×10 to that of 1×5, the French acre thus embracing *two half acres*, each 1×10.   The geographical spread of the several acres will be marked on the map, thus showing that whilst the group as a group covers only a limited area, individual instances of them can be traced sporadically eastward in a somewhat slender and often broken line across to the Rhenish and Danubian valleys to the plains on the mouth of the Danube on the one hand and over the Alpine pass into the Po valley on the other hand.

A further examination of the agricultural units of Italy and those of the Ligurian district of France, and lastly those of Spain, brings back the inquiry to the meaning of the group of associated customary acres of Armorica and Britain.

Lastly, a chapter deals with some other questions

relating to the passing of the tribal and pastoral con-
ditions to the open field system of the village community,
and finally an attempt is made to show how far further
light has been shed by the facts examined upon the
position of the open field system of husbandry as an
important factor in Economic History.

<div align="right">F. SEEBOHM.</div>

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PART I.

BRITISH AND IRISH EVIDENCE.

CHAPTER I.

THE WELSH UNITS OF TRIBUTE AND FOOD-RENT.

I. THE TREF AS THE UNIT OF TRIBUTE.

THE question to be considered in this section is the character of the economic or areal units paying the chieftain's food-rent in kind known as the *gwestva*, or the *tunc pound* in lieu of it, under early Cymric custom.

What *were* the ' maenols ' and ' trefs,' responsible for the gwestva ?

Following no doubt prevalent but more or less vague tradition, the Venedotian Code of North Wales points them back to the time of the mythical Dunwal, ' *the great measurer*,' who, ' before the crown of London and the supremacy of the island were seized by the Saxons, established good laws in the island which continued in force till Howell's time.' It goes on to say : ' The cause of his measuring the island was that he might know the tribute (mal) of the island, the number of " milltyrs " and its journeys in days.' And then follows the measurement of the *erw* or local acre and the number of erws in the trev and the maenol and the cantref.

The cantref is said to consist of two *cymwds each of* 12 *maenols.* ' And of the twelve maenols four are assigned to *aillts* to support dogs and horses and for progress and dovraeth nd one for canghellorship and one other for maer-ship, and *the rest for free uchelwyrs.*'

' And *from those eight* [*maenols*] *of free uchelwyrs* the *brenhin* [or head chieftain] is to have *a gwestva every year, that is a pound yearly from each of them.*' [1] The gwestva or tunc pound was therefore the tribute paid to the chieftain by the uchelwyrs or *free tribesmen* in the free maenols and trevs, quite apart from that of the aillts and taeogs occupying the other maenols.

In South Wales, according to the Gwentian and Dimetian Codes, the *trev* was the unit paying the gwestva or tunc pound, and whilst there is no statement how many tunc-paying trevs there were in the cantref they are said to be grouped into *maenols of* 13 *trevs.*

What then was the trev or tref ?   According to the Codes it was a unit of occupation, traditionally reckoned as of a definite area and as normally containing so many tyddyns or homesteads.   And I think we may go one step further, and fairly identify the group of its occupants with what in the Codes and law treatises is known as the *trefgordd.*   In the phraseology of the Codes and treatises the *gwelegordd* was the family group of members of the *gwely.*   The *gosgordd* was the group of persons in the *retinue* of the brenhin.   So that the *trefgordd* would naturally be the group of occupants of the tref. And as the tref, or its multiple, was the areal gwestva-paying unit, its group of occupants—the trefgordd— would be the payers of it.

What then was the *trefgordd* ?

The word ' trefgordd ' is in frequent use in the
Welsh Codes and the legal tracts of later origin. I
have tried, in my last volume, to realise what it meant
in terms of the actual tribal everyday life of the period—
let us say of Howell's time.

The typical trefgordd turned out, according to the
hints to be gathered from the traditions recorded in
the Welsh Codes and later legal treatises to be the
normally complete or typical self-contained group for
the purpose of tribal husbandry or occupation. It
appeared to be a group of occupants with its *one* herd
of 24 cows and *one* bull, under *one* herdsman and his
dog, with *one* common churn for the milk of the herd,
and with *one* plough and plough-team of 8 oxen for such
co-aration as was required by a mainly pastoral group
of occupiers.

It seems probable that the tref was theoretically
the area occupied by such a trefgordd, *i.e.* in theory
the normal extent of land considered as sufficient for a
complete self-contained group under pastoral conditions
of tribal occupation, with a complete plough-team and
cattle enough to keep up, roughly speaking, a milking
herd of 24 cows.

The unit responsible for the food-rent or tribute was
apparently regarded at the time of the Codes, not as
the group itself but as the area occupied by it. The
occupiers for the time being pay the tribute due from
the tref occupied by them.

According to the Codes the trefs of free tribesmen
seem, as already said, to have been originally kept
distinct from those of the non-tribesmen or taeogs.
But the Denbigh Extent bears witness to the fact not

only of the ease with which the occupants of a tref
or ' villata ' with their cattle could be moved, but also
that in later times at any rate the occupying group
might be a mixed one composed of tribesmen from
more than one gwely and even of non-tribesmen also.
A gwely might be scattered with its cattle in several
tunc-paying villata and have sometimes only a small
undivided share in any particular one.

The cattle, we infer from the earlier evidence, though
in one herd and under one herdsman, often had several
owners.   As in Swiss mountain pastures now, so
in Wales at the time of the Codes, the results or value
of the milk of the herd in the common churn was
divided among the owners according to a test-milking
of their several cows on a certain fixed day.   And
further, as in Switzerland to this day the cattle do
not remain in the same place all the year round, so in
Wales there were summer and winter trefs in tribal
times.

It is not needful to go further into details except to
emphasise the fact borne out by the Codes and also the
Denbigh Survey that the group of occupiers consisted
of several households with their separate tyddyns or
homesteads, according to the description of Giraldus
Cambrensis scattered about here and there, and that in
the tyddyns and their cattle-yards there must have
been provision for the oxen contributed to the plough-
team as well as for the winter shelter of the other cattle.
Thus the *agriculture* of the strictly pastoral tref differed
widely from that of the settled village community
with its permanent agriculture and its scattered holdings
in yardlands on the open field system.   It was a co-
aration by the common plough of portions of the pasture

or waste chosen each year, the crops of the *cyvars* or *erws* ploughed being taken by the contributors to the full team of 8 oxen according to the rules laid down in the Codes, *i.e.* in the same order of rotation as the position of their oxen in the plough-team. So that regarded as a taxable or gwestva-paying area the tref would not consist of so many yardlands nor even of so many erws of pasture and so many of permanent arable, but each year what was required for arable would be taken out of the common pasture, to become pasture again after the removal of the crop, thus laying the foundation in the course of pastoral husbandry for what in more settled agricultural communities afterwards became so prominent an element in the open field system, as already pointed out.

Whether the gwestva-paying area was a *tref* or, as in Venedotia, a ' *maenol* ' of four trefs does not matter for the present purpose. It is enough that we can see how, even from a mainly pastoral point of view, it would be easy for a conquering chieftain to estimate roughly by its area how many such economic units or centres of food-rents a country side or a larger district theoretically should contain ; or to ascertain how many at any time it *did* contain, by counting the *ploughs* or the *herds* or the *churns*, or, in the case of a mountain district devoted to sheep, by counting the shepherds.

It is easy to see also how the tunc-pound paying area might by gradual transition from pastoral to more strictly agricultural times easily come to be regarded even as a *plough-land*, just as in England *hides* more or less tended to become *carucates*, under similar circumstances.

The Welsh word ' *tref* ' in its Irish equivalent ' *treab* ' with its wide meanings is significant enough to illustrate this point. Its dictionary meanings, according to Dr. Atkinson's glossary of the Brehon tracts, are the following :—

> *Treb*, dwelling house, a farmstead.
> *Trebad*, act of ploughing, husbandry.
> *Trebaim*, I plough, manage a farm.
> *Trebaire*, farmer, householder.
> *Bo treb(ith)tha*, plough-ox.

Lastly, it hardly need be said that in taking the tref to be the typical economic and areal unit of pastoral occupation and also of tribute, it is by no means to be regarded as probable or even possible that once chosen as the typical unit, let us say in Howell's time, it could remain in each instance ever after unchanged. There is nothing to show that in another generation the growth of population might not require an extra plough-team, or that the typical herd of cattle might not have so increased as to require another herdsman with his dog. And yet the *tribute* of the *tref* might remain the same tunc pound as at first fixed. Indeed, we so find it in the Denbigh Extent of the fourteenth century.

II. THE LAND MEASURES OF THE WELSH CODES.

However much the maenols and trefs of the Codes, regarded as the units for payment of the gwestva or tribute of the free tribesmen, may have varied from time to time in area or in contents, we are bound by the Codes to regard them as containing theoretically in Howell's time a normally definite area.

Before, however, we can realise what was the meaning

of the areal extent of the fiscal unit of each of the three districts we must first ascertain upon what system of measures their area was determined.

Nor need this in itself be a fruitless or uninteresting object of research, for if the result should be to bring these Cymric normal units of tribute more or less into direct connection with known historical realities, the gain will be worth the trouble involved in the sense of reality given at the outset to the inquiry on which we are engaged.

The measurement of the trefs is described in the Venedotian Code as having been fixed by Dunwal 'the great measurer.' But let it be clearly understood at the outset that in dealing with what for convenience we may speak of as Dunwal's land measurements, we are not dealing with the merely imaginary methods of a mythical personage. We are really dealing with the statement in the Venedotian Code of what were the measurements of the *erw*, the *tref*, and the *maenol* as declared to be actually in use in Howell's time or at the date of the Code. We are dealing with facts of every-day life in North Wales in the early tenth century, one of these facts being that the customary land divisions were not of new invention, their origin being already lost in ancient tradition. That they were attributed to a mythical pre-Saxon ruler of Britain shows only that they were already established by immemorial custom, and as such we must regard them, quite irrespective of whether the mythical ruler ever existed or not.

The text of the Code proceeds to describe the *milltyr* which formed the basis of the measurements thus :—

Starting with the barleycorn—
3 lengths of the barleycorn in the thumb.
3 thumbs in the palm.
3 palms in the foot.
3 feet in the pace.
3 paces in the leap.
3 leaps in the land (tyr), (in modern Welsh called a grwn).
1000 lands in a ' mylltyr.'

And the clause concludes with the statement ' *And that measure we still use here.*'

The ' tir ' or ' land,' 1000 of which made the milltyr, was thus 27 natural feet or 9 natural steps in width. It was in fact the *small end* of the strip of open field ploughing, *probably the day work of the plough* in the practice of co-aration with the customary 8 oxen plough.

Thus the system which lies at the base of the measurements in the Welsh Codes, like those of ancient Egypt and Greece, was based upon *natural measures*, and in Wales the milltyr as the great *itinerary* measure was obviously intimately connected with the system of agriculture. The custom of reckoning distances in ' acres,' *i.e.* by so many small ends of the strip or ' land ' in open field ploughing, is not an otherwise unknown one. Distances up to our own times have been traditionally measured in several counties in *acres*, *i.e.* by so many short ends of the local customary acre, and the practice has found its way with emigrants into Canada.

That the *milltyr* as the great itinerary measure was 1000 ' land-ends ' need not therefore surprise us. Although customary acres in different districts vary in size, it is clear that Dunwal's traditional ' land-end ' of 27 natural feet or 9 natural steps, was that generally adopted by custom. That it continued long in use in

Wales is shown by the following passage from a later legal treatise [1] which graphically describes the method of settling a dispute as to land measurement at a much later date than the Codes:—

> If there be a suit as to land and soil between two persons and one is adjudged to meer (tirvynu) to the other; he is to bring relics; and the owner who swears is to swear at the end of every nine steps (ym pen pob nau *cam*) he shall walk, and that with his feet on his own meer (tervyn). And so from place to place he shall begin measuring unto the place where he shall conclude. And these are called the *' nine steps of meer* (nau cam tervyn).'

The nine steps were the 27 feet of Dunwal's ' landend,' and thus the phrase is proof of the continuance of the habit of measuring by so many short ends of the ' tir or land ' of 9 single steps.

Local custom may be of very ancient origin, but, even if following the tradition of the Venedotian Code, it were allowable to connect the arrangement of Welsh units of tribute with so late a period as that of the break up of Roman rule and so (as suggested by Sir John Rhys) with the coming or migration from Cumbria into Wales of ' Cunedda and his sons,' and if we might further take into account the suspected connection of Cunedda with the military arrangements of the district of the Roman wall, so closely bordering upon the Northumbrian and Cumbrian region, it would still be most unlikely that Cunedda's system of measurement should be, even then, one sprung *de novo* out of the clouds. It surely would point to traditional methods *already in use* in the district from which they came and probably of wider prevalence. Upon what system of assessment, it might well be asked, was the tribute in corn levied which Agricola found to be so

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[1] *Ancient Laws*, ii. p. 207.

unjust and which he (according to Tacitus) so justly
reformed ? It must surely have been collected upon
some system already in use, for tribal custom and
tradition do not easily change in such matters.

That the primitive method of measuring land in
Cumbria and North Britain under early British and
Gaelic custom was by putting one foot closely before
the other is illustrated by one of the poems in Mr.
Skene's ' Book of the Dean of Lismore ' : ' The piteous
tale of Diamed's slaying the great boar.'

> ' Measure, Diamed, the boar down from the snout,' cried Finn,
> hoping to secure his death. ' Along the back he measures now the
> boar.' Diamed is still unwounded and Finn orders him to measure
> it the *other way* ' *against the hair.*'
>> ' He measured once again the boar,
>> The envenomed pointed bristle sharply pierced
>> The sole of him. The bravest in the field
>> Then fell and lay upon the grassy plain.' [1]

The next point to be noted is that in the Gaelic
districts of Scotland in the twelfth century (*i.e.* in King
David's time) *this primitive natural system of measure-
ment was still in use.* Even in legal enactments at
that date no other system or standard seems to have
been available. The length of the legal rods by which
land was measured could not, it seems, have been
otherwise described or understood than in *thumbs and
feet and steps of a middle-sized man.* And it happens
that though some variation in the length of the standard
of the middle-sized man's foot must be allowed for, there
is one instance in which the recognised length of the
natural foot in Gaelic Scotland can be accurately

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[1] Diamed was a ' yellow haired
and blue eyed ' Celt in these poems.
In Mr. Skene's view they embodied
tradition common to both sides
of the Solway Firth. In another
poem the tusk of a bear is measured
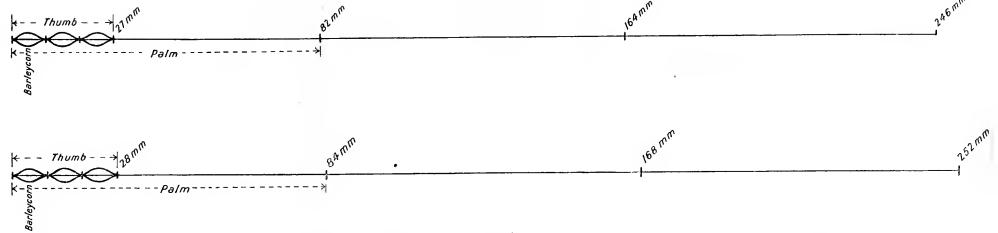by the ' thumb of Finn '—thirty
thumbs of Finn.

Fig. 1.

The length and variation in the *natural foot* is as above, the limit of variation being only 6 millimetres, and this is the limit of variation shown by the typical Greek instance of the two temples of Sunium and seldom exceeded in Greek measures.

determined.   In the description in the ' Assize of King David ' of liquid measures, the dimensions of the gallon of beer and of its divisions are described both in barleycorns and thumbs and feet, and also in grains and pounds' weight of liquid.   The result, I am informed by a mathematician, into whose hands I submitted the problem, determines the length of the natural foot in this case as 251 mm.   (' Acts of Scotland,' 1844, i. 310.)

On the other hand, considering the fact that the Roman decempeda of 2·96 m. would divide into 12 natural feet of ·246, and further taking into account Greek evidence to which reference will be made hereafter, we may fairly take the limit of variation in the normal natural foot to be between ·246 and ·252 m. Larger measures, being multiples of the natural foot or step, must of course be expected also to vary in actual length in various times and places within similar limits so far as natural methods of measurement had not been superseded or limited by a fixed legal standard as possibly in the case of the Roman decempeda.

III. THE   ITINERARY   MEASURE—THE   MILLTYR   OF   1000
    LAND-ENDS—WAS   A   PARASANG   OF   3   GALLIC   LEUGÆ
    OF 1500 PACES OR 27,000 NATURAL FEET.

Starting from the natural foot ·246–·252 m. the milltyr of Dunwal at once assumes a significance of great historical interest.

One of the best-known facts connected with itinerary measures is that whilst, on the one hand, the system adopted by the Romans, took for its unit the ' mille passuum '—the mile of 1000 paces—and divided the mile into 8 stades, on the other hand, when they extended

their roads into Gaul they found another system in use which was based on the same stade, but which made its chief unit of itinerary measure the *leuga* of 12 stades or 1500 paces.

So deeply rooted in Gallic custom was the *leuga* that when the Roman roads reached Lyons, where the routes from the East converged and passed into Gaul, the milestones had no longer to be placed a Roman mile of 1000 paces apart, but a *leuga* of 1500 paces apart. And also it became necessary in the Itineraries, in districts where the two systems met, to state distances between the stations both in so many miles and in so many leugæ. There is good evidence to show that not only in Gaul, but also in the valleys of the Rhine and the Danube, and its tributaries the Enns and the Inn, the *leuga* and not the Roman mile was the unit of measurement on the lines of traffic from the East passing north of the Alps into Gaul, and also on the Alpine passes connecting the valleys of the Danube and the Po.

The Greek and Roman stade (185 m.), the Roman mile of 8 stades (1480 m.), and the leuga of 12 stades (2220 m.) were calculated on the Roman standard foot of ·296. As the Roman decempeda of 2·96 m. contained 12 natural feet of ·246, the Roman pace of 5 Roman feet was equal to 6 natural feet, *i.e.* two of Dunwal's single steps, of lower standard. Thus the *Roman mile* of 1000 paces = 6000 natural feet of ·246, and the *leuga* = 9000 of such feet.

Dunwal's measures at the lowest and highest standard would work out thus :—

Foot	. . . .	·246–·252 m.
Step	. . . .	·738–·756 m.

[Double step .	.	.	.	.	.	.	.	$1\cdot476$–$1\cdot512$]
Leap .	.	.	.	.	.	.	.	$2\cdot214$–$2\cdot268$ m.
Land .	.	.	.	.	.	.	.	$6\cdot642$–$6\cdot804$ m.
And the milltyr of 1000 lands .			.	.	.		.	6642–6804 m.
(equal to three leugæ of			.	.	.		.	2220–2268 m.)

IV. THE ERWS, TREFS, AND MAENOLS OF THE VENEDOTIAN CODE.

The area of the Venedotian maenol of 4 trefs, which was the unit for gwestva payments commuted into the tunc pound, is not described as intentionally a direct division of the square milltyr. The unit of area is the *erw*, or strip of land for ploughing. And the tref and maenol are described in multiples of the *erw*.

The first thing therefore is to ascertain the area of the *erw*.

The natural expectation would be that the 'tyr' or 'land' *of Dunwal's measurement* should be the *erw*, the multiples of which should form the tref or maenol.

But although the milltyr was declared in the Code to be 'still in use here,' a rival *erw* called the 'legal erw' seems to have become locally prevalent in Howell's time, and to have been substituted as the unit of the trefs and maenols of the Code for the earlier one.

We are thus led to the inference that in North Wales Dunwal's maenol and tref had before the date of the Code been superseded by one based upon some other local customary erw distinguished in Howell's time as the *'legal'* one, or that the two were in customary use in different districts side by side.

The description of this 'legal erw' is given immediately after the description of the milltyr, ending with

the statement *'and that measure we still use here.'* But
the very next words in a new paragraph (perhaps inter-
polated) state 'and then [? afterwards] they made the
measure of the *legal erw*' thus. And this new descrip-
tion, while repeating the statement 'three barleycorns
to the thumb, three thumbs to the palm, and three
palms to the foot,' and thus starting from the same
natural foot, seems to turn off on another line so as
to follow local traditions of actual ploughing with the
plough-team of 8 oxen yoked 4 abreast. It proceeds as
follows :—

> ' 4 feet in the short yoke [*i.e.* for one ox].
> 8 in the field yoke [*i.e.* for pair of oxen].
> 12 in the lateral yoke.
> 16 in the long yoke [*i.e.* for 4 oxen yoked abreast].
> ' And a rod equal in length to that long yoke in the hand of the
> driver, with the middle spike of that long yoke in the other hand of
> the driver, and as far as he can reach with that rod stretching out
> his arm are the two skirts of the erw, that is to say, the breadth
> of the legal erw, and 30 times that is the length of the erw.'
> (V.C. Book II. c. xvii. 5, 6.)

And then the passage goes on to state that there were
to be 4 such erws in every *tyddyn*, 4 tyddyns in every
randir, 4 randirs in every *gavael*, 4 gavaels in every
trev, 4 trevs in every *maenol*. So that there would be
1024 erws in the maenol paying the tunc pound.

Now this description of the 'legal erw' makes it
when examined evidently far too large for it possibly
to be the 'land' or 'tyr' attributed to Dunwal. But
there is a repetition of the same description of the 'legal
erw' almost word for word in another section of the
Code (II. xii. 2) and happily, in this case it is followed
by an addition which when examined really *does*
seem to describe Dunwal's land as in use side by side
with the 'legal erw.'

This addition is as follows :—

> Others say that *the rod is to be as long as the tallest man in the tref with his hand above his head, and proceeding in a similar manner as in the other.*

Now a rod or goad, as long as the height of a tall man with his hand above his head,[1] could not be much longer than 2 metres, and the accuracy of the description as applying to Dunwal's land, 27 natural feet, or from $6\frac{1}{2}$ to $6\frac{3}{4}$ metres wide, anyone can test by actual trial. The driver, with a goad of that length in his right hand, moving backwards in front of his team, with his other hand on the middle spike of the long yoke of 4 oxen abreast, *i.e.* standing in the middle of the erw where the first furrow was ploughed, could keep himself, and the team as it proceeded, all along in the middle of an erw of 27 natural feet in width by stretching out his arm and goad so that the end of it might touch and sweep along the side of the erw. Then having turned his team on the headland in order to plough the second furrow up against the first, he could in the same way sweep the other side of the erw with the end of his goad on the return travel of the plough.

If we may take this graphic description of actual ploughing to be that of Dunwal's ' land ' with its end of 27 feet or 9 steps, so constant in its customary use as to give rise to the phrase ' *the nine steps of the meering,*' then adding to the description of the ' land ' the point omitted in the first mention of it, that its length like that of the other was thirty times its breadth, we are led to the interesting further result, to which we shall

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[1] A similar rod of a man with his hand above his head occurs in the description of the Greek areal *modius* for corn land and was apparently 2·36 m. in length.

recur hereafter, that three of these ' lands ' (1 × 30) put
side by side would make an acre 1 × 10 in form and
identical in area and furrow with the acre which has
survived in use ever since, and which became at last
the English statute acre.

The point to be noted, however, at this moment is
that had the maenol described by the Venedotian Code
originally been composed of 1024 of Dunwal's ' lands,'
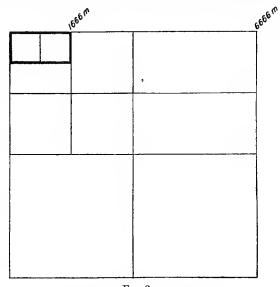
Fig. 2.
The maenol and the square milltyr.

the maenol paying the tunc pound would have been in
area almost exactly $\frac{1}{32}$ of the square milltyr. It would
have contained 22,394,880 square natural feet in two
squares as in the diagram. The square milltyr con-
tained (27,000 × 27,000) 729,000,000 square natural
feet, and $\frac{1}{32}$nd would therefore be 22,781,250. Its
area (the foot being taken as ·247) would have been
13,886 ares.

Returning to Howell's ' legal erw,' we may, I think, after recognising the correspondence of the ' graphic ' description in the ploughing of Dunwal's erw, with its dimensions in feet, rely upon the accuracy of the similar description of the ' legal erw.' It is in fact exact enough to identify it with one third (in shape 1 × 30) of the *customary acre still in use in North Wales*, which is in
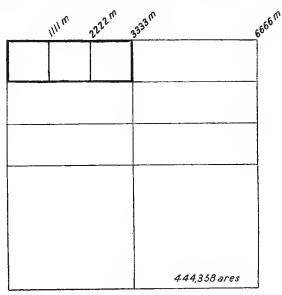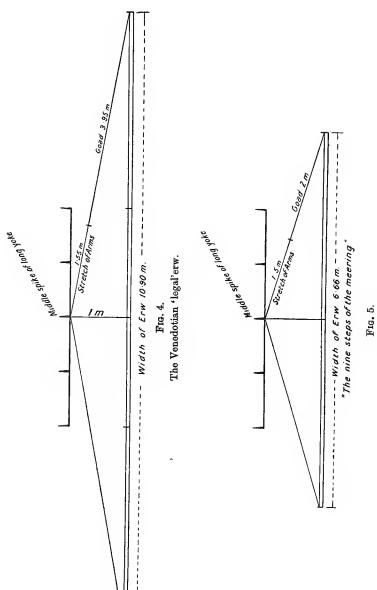
Fɪɢ. 3.
Howell's maenol and the square milltyr.

shape 1 × 10, and has a furrow of 329 m. and an area of 108·24 ares. This local acre, moreover, is still divided into three erws which go by the name of the ' *true erw.*' The area of this ' true erw ' (1 × 30) is 36·08 ares. And 1024 of such erws would make a maenol of 36,945 ares, *i.e.* almost exactly $\frac{1}{12}$ of the square milltyr, which on the same standard of the natural foot would equal 37,029 ares. From the above diagram it will be seen

D

Middle spike of long yoke

1·55 m

Stretch of Arms

Goad 3·95 m

1 m

Width of Erw 10·90 m.

FIG. 4.

The Venedotian 'legal' erw.

Middle spike of long yoke

1·5 m

Stretch of Arms

Goad 2 m

Width of Erw 6·66 m.

"The nine steps of the meering"

FIG. 5.

Dunwal's 'land.'

that Howell's maenol would fit into 3 squares, and we shall find that it equalled 6 Dimetian trefs.

The correspondence of the ' graphic description ' of Dunwal's and Howell's erws with actual measurements will be seen from the diagram on the opposite page.

V. THE ERW AND TREF OF THE GWENTIAN CODE.

The erw of the *Gwentian* Code is described as 2×18 long yokes of 18 natural feet. It would contain 11,664
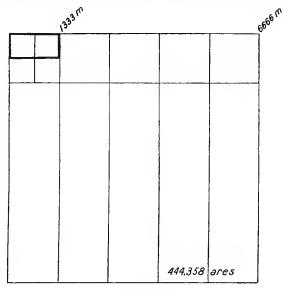

Fig. 6.

square natural feet. The tref paying the tunc pound is described as containing 1248 such erws, and therefore it would contain 14,556,672 square natural feet, almost exactly $\frac{1}{50}$ of the square milltyr, *i.e.* 14,580,000 square natural feet. As a division of the square milltyr it

would again take the form of two squares, and its area would be 8887 ares.

If the number of erws were 1250 instead of 1248 the number of square natural feet would be exactly equal to that in $\frac{1}{50}$ of the square milltyr.

VI. THE ERW AND TREF OF THE DIMETIAN CODE.

The Dimetian erw is described in the Code as measured by 2×16 long yokes of 16 feet. It would thus contain 8192 square natural feet.
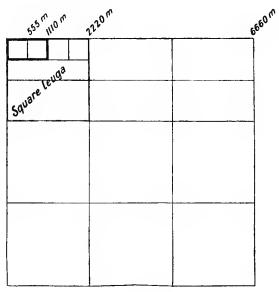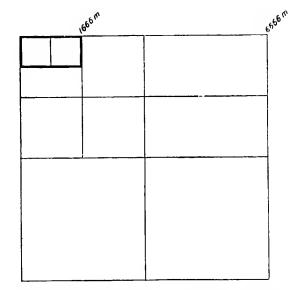

Fig. 7.
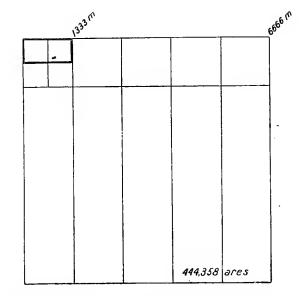
The *tref*, or gwestva-paying unit of 1248 erws, would contain 10,223,616 square natural feet, *i.e.* nearly exactly $\frac{1}{72}$ of the square milltyr, *i.e.* 10,125,000 square feet.

Dunwal's *Venedotian Maenol* paying the tunc pound according to the description in erws in the Code.
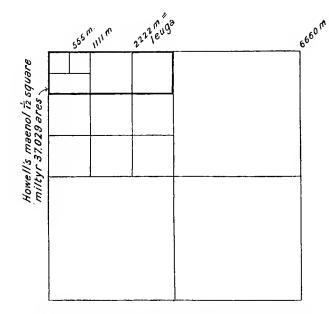
22,394,880 square natural feet.
22,781,250 = $\frac{1}{32}$ square milltyr.

Area on the *standard of* ·247 *foot according to Code* 13,834 ares.
As division of the square milltyr . . . . 13,886 ares.

Gwentian tref paying the tunc pound as described in erws in the Code.

14,556,672 square natural feet.
14,580,000 = $\frac{1}{50}$ square milltyr.

8881 ares.
8887 ares.

Dimetian tref paying the tunc pound as described in erws in the Code.

10,223,616 square natural feet.
10,125,000 = $\frac{1}{72}$ square milltyr.

6217 ares.
6172 ares.

It would take the form of two squares and its area would be 6217 ares, the $\frac{1}{72}$ of the square milltyr being 6172 ares. And it would equal one-sixth of Howell's maenol, and $\frac{1}{8}$ the square leuga.

VII. GENERAL RESULTS.

To sum up the result of this examination of the areas of the Welsh tunc-paying units of tribute in their relation to the square milltyr, we have found them to work out successively as under :—

Howell's maenol	.	.	. $\frac{1}{12}$ of the square milltyr.		
Dunwal's ,,	.	.	. $\frac{1}{32}$	,,	,,
Gwentian tref			. $\frac{1}{50}$	,,	,,
Dimetian ,,	.	.	. $\frac{1}{72}$	,,	,,

The diagrams will show to the eye how Howell's maenol falls as a division of the square milltyr into three squares while the others fall into two squares.

However mysterious may be the traditional origin or author of these measurements of the units of tribute adopted in the Welsh Codes, the correspondence of them as divisions of the square of the great itinerary ' milltyr,' described as in use for the purposes of the ' mal,' goes very far, I think, to show that they may be regarded with some confidence as in a true sense realities. They must be regarded no doubt as statements of *normal* or *typical* areas, *i.e.* of the amount of land traditionally reckoned, if we are right, as sufficient for the occupation of the typical trefgordd with its one plough, its one herd of cows, and its one churn. As such, and so far, they bear the stamp of reality. Further it happens that there is another kind of evidence, altogether independent of the Codes, which, so far as it goes, incidentally confirms the

genuineness of these typical areas.   There is the evidence
of the Report of the Agricultural Commission of 1820,
already alluded to, as to the customary *local rods* by
which agricultural areas had for generations been
measured in Wales, and which were still in customary
use.   They are described by the Commissioners in
English feet, not therefore with absolute exactness, but
sufficiently for our purpose.

(1) The *paladyr* of North Wales, the *llath* of Merioneth-
shire, and the *pedair llathen* of Montgomeryshire,
all of which are alike described as 4½ yards or
13½ English feet   .   .   .   .   . *i.e.* = 4·12 m.
(2) The *bat or eglyshaw* described as 11 English feet, *i.e.* = 3·35 m.
(3) The *Cornish gad* or goad, known in North Wales as
cyvelin, 9 English feet   .   .   .   . *i.e.* = 2·75 m.

Now these customary local rods are not mentioned
in the Codes.   We know of them only by the fact that
they have been from time immemorial the customary
agricultural measuring rods in local use.   The fact is
important that these customary local rods are distinctly
connected, not only with the local customary acres of
Wales, but also with the *milltyr* of the Venedotian Code.

(1) 1600 paladyrs = the milltyr (6592 m.)
(2) 2000 bats   =   ,,   (6700 m.)
(3) 2400 gads   =   ,,   (6600 m.)

And what is still more remarkable is the relation
of these customary rods to the double squares of the
maenols and trefs described in the Codes.

(1) 200 × 400, *i.e.* 80,000 square *paladyrs,* would
make the two squares of Dunwal's *Venedotian*
maenol   .   .   .   . (824 × 1648 m.)
(2) 200 × 400, *i.e.* 80,000 square *bats,* would make
the two squares of the *Gwentian* tref .   . (670 × 1340 m.)
(3) 200 × 400, *i.e.* 80,000 square *gads,* would make
the two squares of the *Dimetian* tref .   . (550 × 1100 m.)

The uniform correspondence of 200×400 of the Welsh customary measuring rods in actual use, with the length of the sides of the two squares into which the maenols and trefs fall as divisions of the square milltyr, affords strong and independent incidental evidence of the reality of the description of them given in the Codes.

Finally, before we pass from the consideration of these Welsh units of tribute, there yet remains the further important question whether the actual area of Wales will admit of the possibility of maenols and trefs with so large an area as these figures suggest.

Before we can fully rely upon Howell's version of what he regards as Dunwal's measurements for the purpose of his ' mal,' we must ascertain how far they are consistent with the area with which his system had to deal. It is notorious how often traditional records of figures contain within themselves the proof of uncertainty and exaggeration.   It is not so in this case.

According to the statement in the opening clause of the Gwentian Code there were in Cymru in the time of Howell the Good :—

In Venedotia	18 cantrefs	
In Deheubarth or South Wales	64 ,,	
In all . . .	82 cantrefs (*i.e.* 8200 trefs)	
There were also 3 score trefs beyond the Cyrchell	60 ,,	
and 3 score trefs of Buallt	60 ,,	
Making a total of . .	8320 *trefs* in all.	

There are now 4,721,823 English acres in Wales and 368,399 in Monmouth, making a total of 5,090,222 acres. This divided by 8320, the number of trefs, gives 609 acres for the tref. Sir John Price in his ' Description

of Wales ' (1559 A.D.) estimates the number of cantrefs differently, thus :—

In Gwynedd or North Wales . . . 16 cantrefs
In Powys . . . . 13 ,,
In Mathrafael between Wye and Severn . 4 ,,
In Dynefawr . . . . . . 26 ,,
　　　　　　　　　　　　　　　　　　　　　　　—
　　　　　　　　　　　　　　　　　　59 cantrefs in all,

making the number of trefs 5900. This estimate, which is considered by recent writers to be still excessive, would allow 800–900 acres to each tref.

	Ares.	Statute acres.	Statute acres in tref.
Howell's Venedotian maenol of 4 trefs	37,300	930	233
Dunwal's Venedotian maenol of 4 trefs	13,886	347	87
Gwentian tref	8,887	—	222
Dimetian tref	6,172	—	154

Obviously there would be room for all the trefs with ample surroundings of moor and mountain even on the highest estimate of the number of cantrefs.

On the whole, therefore, we may, I think, fairly conclude that figures which touch reality in so many directions cannot be put aside as mere random guesses. They seem to be founded upon local knowledge of the facts and customs which formed the basis of the system of tribute described in the Welsh Codes, and they are all the more to be trusted from their close connection with the agriculture and actual methods of ploughing under the pastoral conditions of tribal life.

CHAPTER II.

THE IRISH UNITS OF TRIBUTE AND FOOD-RENT.

I. THE LAND MEASURES OF THE BREHON TRACTS.

WE are now in a position to extend our inquiry to the Brehon or Irish land measures and units of food-rent or tribute.

Like the Welsh, they are based upon natural measures starting from the 'ordlach' or inch, described as of *three barleycorns* put end to end. But, like the Greeks, the Brehon writers make their calculations in an *artificial foot* of 12 inches or 4 palms, instead of the 9 inches and 3 palms of the natural foot. It will be easy, however, to translate the results into natural feet of 3 palms for purposes of comparison.

Without going too much into detail it may be said generally that from the thirteenth century records down to the Carew MS. of the time of James I. the prominent units of land measurement are described as *plough-lands*. The Brehon tracts, whilst disclosing that co-aration by tribesmen was a necessary and important element in tribal husbandry, as in Wales, describe the tribal arrangements in terms and in the language of pastoral life, with remarkable survivals from a wilder life still, in which the chief export of the island was the *female slave*.

In the Brehon tracts values are generally stated

in cows, and *cumals* of cows. The *cumal* or female slave came to be reckoned as equal to three cows, and was the chief unit of value and payment. As I have shown in my last volume [1] the payment in *cumals* or *ancillæ* forms a striking connecting link between the Ireland of the Brehon tracts and the Armorican district. For not only did the cumal of the Brehon tracts find its equivalent in the ancilla of the Breton ' Penitentials,' but even the equation with silver was the same in both cases. The cow was reckoned as equal to the ounce of silver in both cases, and the female slave of 3 cows to 3 ounces of silver, the ounces on both sides of the Channel being apparently the Roman ounce of 576 wheat grains in weight. As compared with the Welsh Codes the silver value of the ' cumal ' was roughly equal to that of the Welsh cow, equated with 3 ounces of somewhat differing weight.

Leaving aside then for the present the plough-lands of the later documents and breathing freely the air of the Brehon tracts with their payments in cumals and cows, the inquiry must be confined to the question what units of areal measurement are described in these tracts as in use for the purpose of food-rent to the chieftain, or in payment for rights of grazing under tribal customary arrangements.

The answer is that throughout the Brehon tracts the amounts of land held by the various grades of tribesmen and chieftains are described in so many *tir-cumails* ; and that two chief normal units of area for the purpose of grazing and food-rent or tribute are independently described in two separate tracts

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[1] *Tribal Custom in Anglo-Saxon Law,* 1902, chap. iv.

(in 'Ancient Laws of Ireland,' III. 325 and IV. 276), both these normal areas being called by the ancient term ' *tir-cumail*,' and each of them being in the form with which we are now so familiar, of two squares.

II. THE SMALLER TIR-CUMAIL.

The smaller unit (III. 339) easily justifies its name as a ' tir-cumail '—' *the land of the cumal* ' or female slave. It may not at first sight seem to be directly connected with food-rent or tribute. Its direct connection seems to be rather with the loan of stock by the chieftain to his tenant, the cumal of three cows being the return for the grazing of the ' tir-cumail ' of good pasture-land for a year. But as every chieftain made loans of cattle to his tenants, the practice had its due place in tribal economy.

That this was the case is shown by a quite independent passage (IV. 304) which states that the ' *tyr-m bo* ' *i.e.* ' land of one cow '—is that on which seven cows are grazed and for which one cow is given at the end of the year. (See also IV. 133 and III. 129).

The smaller ' tir-cumail ' thus represented the normal area for 21 cows' grazing of good land and a return or rent at the end of the year of a cumal of 3 cows. The 3 cows rent added to the other 21 cows made a herd of 24, which with their bull would make what we shall find was in Ireland the normal herd connected with the plough-land. It would thus correspond very closely with what we have seen to be the normal herd of Welsh tribal custom associated with the single plough.

The dimensions of this smaller 'tir-cumail' are thus described and the figures of actual length are easily added on the basis of the variation in the natural foot :—

3 grains (elsewhere described as *barleycorns*, set end to end)	= orlach (thumb)	
4 orlachs	= bais (hand)	
3 bais	= troiged (foot)	. ·328–·335 m.
12 troigeds	= fertaig (yoke)	3·926–4.02 m.
12 fertaigs	= forraig .	. 47·232–48·24 m.
6 forraigs	= breadth of tir-cumail	283·4–289·44 m.
12 ,,	= length of ,,	566·8–579 m.

(making an area of 1606 to 1676 *ares* in two squares) the side of each square being equal to $\frac{1}{8}$ of the *leuga*.

Fig. 8.

The small tir-cumail and the square leuga (of higher standard).

The tir-cumail taken on the lower standard $= \frac{1}{32}$ of the square leuga taken at the higher standard, and it would contain 400 British statute acres in its two squares.

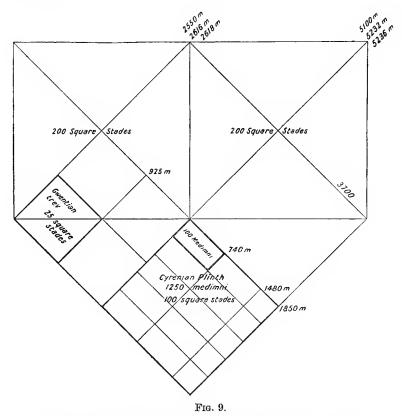That the orlach was equal to the Welsh thumb

or inch is shown by its being equal to 3 barleycorns, set end to end. But instead of proceeding to describe the palm of 3 orlachs or inches, the writer makes a ' *bais* ' or *hand*, *i.e.* palm with thumb, of 4 orlachs, and an artificial foot of 3 hands or 12 orlachs, which would equal 4 Welsh palms. Converting for purposes of comparison his fertaig of 12 feet of 4 palms into 16 natural feet of 3 palms, the Brehon fertaig becomes equivalent to the Welsh ' long yoke ' of the Venedotian and Dimetian Codes. The forraig of 12 fertaigs becomes 192 natural feet or 12 long yokes. The breadth of the tur-cumail becomes 1152 natural feet or 72 long yokes, and the long side of the double square becomes 2304 natural feet or 144 long-yokes. So that intimate connection is at once indicated both with the leuga and with Welsh agricultural measures.

III. THE LARGER TIR-CUMAIL.

The larger tir-cumail is described as follows (in IV. 276) in the tract ' Divisions of Land ' :—

3 grains	= proper inch (ordlach innraic)			
6 inches	= hand (dorn) (with thumb *extended*)			
2 hands	= foot (traiged)	.	.	. ·328–·335 m.
6 feet	= pace (deisceim)	.	.	. 1·968–2·01 m.
6 paces	= intritt .	.	.	11·808–12·06 m.
6 intritts	= lait	.	.	. 70·85–72·36 m.
6 laits	= forrach .	.	.	. 425·10–434·16 m.
6 forrachs	= airceand (breadth of tir-cumail) . 2551–2605 m.			
12 ,,	= fot (length of ,,) . 5102–5210 m.			
Its area is 130,152 to 135,721 ares.				

It will be observed that the dimensions of this greater tir-cumail are 9×9 times those of the lesser

tir-cumail, and so the area is 81 times that of the lesser tir-cumail, viz. 214,000,838 square natural feet.

FIG. 9.

Great tir-cumail of higher standard, 5000 medimni, 400 square stades.

Postponing for the moment the question of the relation of this greater tir-cumail to itinerary measures, the more immediate point from a Brehon point of view is whether it corresponded with any widely prevalent traditional or customary land division mentioned in Irish Annals in the Brehon tracts or in the ancient

Irish poem [1] which most directly deals with the ancient land divisions of the country, and which Mr. Skene regarded 'as giving probably the oldest views of the land divisions all over Ireland.' [2]

In the 'Annals of the Four Masters' there is an entry which tells us that the mythic King Ollamh Fodla appointed a *Taoisech* over every *triocha ced* and a *Brughaidh* over every *baile.*

The trichaced and the baile were therefore recognised divisions in early times.

According to the ancient poem Ireland contained 184 '*trichaceds.*' Each *trichaced* contained 30 '*baile biataigs*'—*i.e.* 'places of food-rents'—each sustaining 300 cows, and, according to the poem, there were 5520 of them in the four provinces. The *trichaced* goes back far into the past of Irish poetry and legend. And the term itself, meaning 'thirty hundreds,' implies that the baile must have been in some sense properly a '*hundred.*' It was seemingly a 'hundred'

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[1] This poem, the text of which is given in the Celtic Society's edition of the *Battle of Magh Leana* (p. 107) and Mr. O'Donovan's translation of which is also found in Skene's *Celtic Scotland,* iii. p. 154, may not be itself of very early date, seeing that it uses words and phrases which are not found in the Brehon tracts, *e.g.* ' *seisrig* ' for plough-land containing 120 ' *acra* ' (neither of these two words being found in Dr. Atkinson's Glossary). And it is even open to suggestion that the plough-land of 120 acres may have been introduced by early English emigration. But it no doubt represents, in general, very early tradition. The *seisrig* is translated probably wrongly, as a ' six-horse plough.' In the *Crith Gabhlach* (iv. p. 307) we read of ' a *fourth* part of ploughing apparatus, *i.e.* an ox and a ploughshare and a goad and a bridle,' showing that the Brehon plough-team was of 4 oxen, and implying co-operation in the ploughing. I am indebted to Mr. Norman Moore for the information that the modern word *seisreacht,* plural seisrighe, is now used in Ireland for a 'plough-team yoked to a plough.'

[2] *Celtic Scotland,* iii. 154.

because according to the poem it found grazing for 300 cows, *i.e.* 100 *cumals of cows*. At any rate, it is difficult and perhaps needless to make any more likely suggestion.

Now Ireland contains 19,759,600 English statute acres, and this area divided by the number of bailes would give about 3525 acres to the baile. The great tir-cumail would contain roughly 3200 English acres. So that if there be any correspondence between this greater tir-cumail and the ancient tribal divisions of the poem it must be with the baile or typical place of food-rent.

The figures are near enough at least to suggest the identity of the greater tir-cumail with the baile.

The poem describes the latter as a complex unit of agriculture and pastoral husbandry somewhat of the type of the Welsh trefgordd. It informs us that its area contained both arable and pasture, being normally reckoned as including room for 12 ploughs with 120 acres to each, besides pasture for 300 cows, *i.e.* for ' 4 full herds ' of 75 cows each.

It will be seen at once that the combination of ploughs and cattle practically corresponds with that of the Welsh trefgordd. Each of the ' *four full herds* ' of 75 cows is associated with 3 ploughs, so that each single plough is associated with a herd of 25 cows as in the Welsh trefgordd.

Assuming, as we probably may fairly do, that the greater tir-cumail was identical with the baile or greater unit of food-rent, the next point is that the plough-land or area allotted to each single plough and the grazing of its 25 cows was one-twelfth of its whole area.
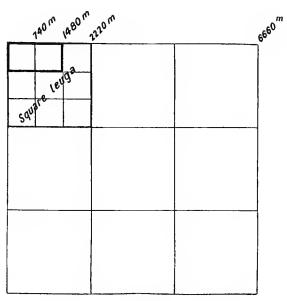
Fig. 10.
Irish plough-land for herd of 25 cows.
Area, 10,833–11,370 ares.

Square leuga.

E

We have seen that the greater tir-cumail contained
in its two squares 214,990,838 square natural feet.
So that each of the 12 single plough-lands with its
grazing lands would contain 17,915,069. Now the
square leuga contained 81,000,000 square natural feet;
and two squares, each of them $\frac{1}{9}$ of the square leuga,
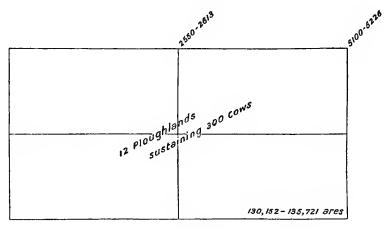would contain 18,000,000 square natural feet—almost

FIG. 11.

exactly the area of the plough-land. There were
therefore almost exactly $4\frac{1}{2}$ plough-lands in the square
leuga. The diagram on page 47 will make this clear
to the eye. It will also make it clear that the plough-
land would contain 32 square stades, *i.e.* half the area
of a square Roman mile, thus emphasising the connec-
tion with itinerary measures.

The area allotted to the Brehon single plough with
its herd of 25 cows, as a detached unit in the form of
two squares and with an area of from 10,833 to 11,370
ares, would take its place among the Welsh tunc-paying

units between the Venedotian maenol and the Gwentian tref.

According to the poem :—

> ' A baile sustains 300 cows
> ' With 12 plough-lands.
>   *   *   *   *   *   *   *   *
> ' Two score acres three times
> ' Is the land of a plough-team.
> ' The land of three plough-teams therefore
> ' Is the quarter of a *Baile Biataig.*'

The above diagram will sufficiently explain the divisions of the great tir-cumail on the hypothesis that it represents the typical ' Baile Biataig ' of the ancient poem. (Fig. 11.)

Lastly, let us try to understand what this great tir-cumail meant to the writer. The tract commences by stating that there are two kinds of land, arable and non-arable. (' Ancient Laws of Ireland,' IV. 277.)

(1) The best arable land is thus described :—

' An inhabited land in which everything good is good, both *corn* and *milk* and *flax* and glaisin-dye-plant, and honey and royd-dye-plant and sweet herbs : which does not require the application of manure or shells : in which there are no sticking plants.

' (2) *Hilly arable land.*—There is water upon this usually, and ash trees in every second field (maigin) of it. And it is good for every plant and for every produce in general.
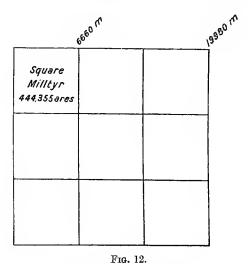
' (3) *Labour-requiring arable land*, this is axe-land in which every plant grows freely.'

Then there are three kinds of weak lands described :

(1) *Weak*—a heathy mountain and furze upon it.
(2) *Coarse*—comprises land of fern fields and good fields.
(3) *Deep*—black land and bog.

Then the writer goes on to say *the measurement of tir-cumails is alike, their ' log ' (i.e. value) is unlike.*

As to the arable land :—
     No. 1, cumals of 24 milch cows is its ' log '
     No. 2, ,,   ,, 20 ,,   ,,   ,,   ,,
     No. 3, ,,   ,, 16 ,,   ,,   ,,   ,,
Coarse and weak land :—
     Cumals of 12 dry cows are paid for it.
Deep land :—
     Cumals of 8 dry cows are paid for it.

It is clear from this description that the great tir-cumail even of the best land is not regarded as arable

Fɪɢ. 12.

The trichaced of 3,999,195 ares.

alone, but as for both ploughing and grazing (for ' corn '
and ' milk '), and the growth of flax and other
things.

And the ' log ' of this best land is to be reckoned
in ' cumals ' of 24 cows. The poorer land in cumals
of a lesser number of cows. It is not, however, easy
to understand what this reckoning means and we shall
not attempt to guess at it.

IV. THE TRICHACED.

Passing on to the *trichaced* (*i.e.* the group of 30 bailes according to the ancient poem), we can hardly fail to notice that, reckoned as 30 greater tir-cumails, its area would equal 9 square milltyrs or 81 square leugas.

The square milltyr reckoned on the standard of the ·247 natural foot equals 444,355 ares. Nine times this area equals 3,999,195 ares for the trichaced, and $\frac{1}{30}$ of this would equal 133,306, which is between the limits of the area of the greater tir-cumail—130,152 to 135,721 ares. (Fig. 12.)

V. CONCLUSION.

To sum up the evidence of the Brehon tracts and the ancient poem as regards the Irish tribute or rent-paying areas, the close relation between them seems to justify the identification of the ' Baile Biatach ' of the poem with the great tir-cumail of the tracts. If this be so, the Brehon evidence presents us with four separate units :—

1. The *small tir-cumail* with an area of 1604–1676 ares for pasture only of the normal herd of 25 cows.

2. The *single plough-land* with an area of 10,833 to 11,370 ares which besides the necessary arable has to afford grazing to sustain the normal herd of 25 cows.

3. The *great tir-cumail* or *baile* containing 12 of these plough-lands and sustaining 300 cows : divided into 4 quarters each with its triple or ' full herd ' of 75 cows.

4. The *trichaced* of 30 *bailes* or 360 plough-lands with their 360 normal herds, *i.e.* 9000 cows.

We are not told directly what may have been the tribute from these areas. All we can say is that if each of the 360 plough-lands in the trichaced provided in

cows and corn a ' night's entertainment ' the trichaced
would supply the chieftain's table for 360 nights in the
year.   But that this was actually the meaning of the
trichaced it would be rash to regard as more than a
guess.

Even were it to be assumed that the tribute from the
trichaced may have been the year's provision for the
chieftains and so the plough-land regarded as respon-
sible for the ' *one* night's ' provision, it would not
follow that the Irish plough-land was also a pound-
paying unit like the Welsh trev or maenol.   The fact
already mentioned must be borne in mind that whilst
the silver value of the cow in the Welsh Codes is reckoned
as *three* ounces of 20*d.*, in the Brehon tracts it is reckoned
as worth *one ounce only*, the ounces however not being
alike.   The Welsh tunc pound was thus worth four
cows.   And the right way to look at any comparison
between Irish and Welsh values, if a comparison is to
be made in values, would probably be to regard *four*
cows as the possible traditional reckoning of the con-
tribution of the plough-land and its associated herd
of 25 cows in both countries.   And it may be fair to
suggest that the recognition of this difference between
the Brehon and the Cymric silver value of the cow may
have a further significance.   It may afford a reason
why in Ireland three plough-teams with three normal
herds of 25 cows are combined to make the ' full herd '
of 75 cows.   For just as the single Cymric plough-team
and herd of 25 cows on this hypothesis might be con-
ceived of as paying the Cymric value of 4 cows in the
tunc pound of silver, so the *three* Irish plough-lands with
their full herd of 75 cows, paying 12 cows (4 cows per
plough-land and normal herd) would also be paying the

Brehon silver equivalent of an Irish pound of silver. And though on the hypothesis that the trichaced supplied 360 nights' entertainments to the chieftain the silver value for each night would be only 6*s*. 8*d*., its real value regarded as equal to 4 cows would seem adequate enough, regarded as a food-rent. But, once more, let a clear distinction be made between the *facts* and the guesses founded upon them. The coincidences between Brehon and Welsh tribal custom are significant enough without any attempt to overstrain them.

CHAPTER III.

THE UNITS OF TRIBUTE IN GAELIC SCOTLAND.

THERE is very good reason why the same precision should not be found in Gaelic as in Cymric arrangements of tribute. A reminder is hardly needful that, however consistent Celtic custom may have been, it need not be expected to have developed at the same pace or on the same lines under different circumstances.

From the Carew documents we learn that the Gaelic chieftain in Ireland in the sixteenth century was still consuming the tribute of his tribesmen and tenants by actually quartering upon them with his numerous retinue to their great oppression and hardship. This oppressive method of enjoying tribute had not been so generally commuted into money payments in Ireland as in Wales centuries earlier.[1] If we follow the practice into the Isles of Scotland we find the process of commutation going on in the sixteenth century— by no means completed.[2]

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[1] *Miscell. Irish A. S.,* 139–143. 'Book of Deer,' lxiv.

[2] In the interesting survey of the 'Isles of Scotland,' 1577–1595, printed in Mr. Skene's *Celtic Scotland,* we find the islands assessed at so many '*pounds of auld extent*' or as containing so many 'merklands.' The island of Lewis, for example, is said to contain 60 merklands, having been assessed at '40 lbs. auld extent.' But the record informs us that this assessment in 60 'merklands' or '40 lbs. of auld extent' was a commutation of food-rents which could still be claimed in kind as under :—

18 score (360) chalders of victual.

On the Gaelic mainland of Scotland, however, the case was different.   Already in the times of the ' Early Kings of Scotland ' there is good evidence of advancement in settled agriculture on quasi-manorial lines.

58 score (1160) cows.

32 score (640) widderes.

' and a great quantity of fishes, &c. This might he required as provision for " *their cuidichies* " *i.e.* feasting their master when he comes in to the cuntrie, ilk ane thair nicht or twa nichtes about according to their land and labouring.'

The islands were clustered in groups and the Lewis group contained 313 merklands.

The island of Skye was at the head of another group.   One of its group—*Slait*—contained 64 merklands and it is said to pay ' auld duties, victual, butter, cheese, wine, aill and [in] a quantity as their master may be able to spend, being " ane nicht " on ilk merkland, with 600 men in company.'   The Skye group contained 236 merklands.

The *Mull* group contained 612 merklands and each merkland of the 300 in Mull itself paid for ' cuddiche ' whenever the lord comes to them :—

5 bolls of beer.

8   ,,   meill.

20 stanes of cheese.

4   ,,   butter.

4 mairtis.

8 wedders.

2 merk silver.

2 doz. pultry.

The *Ila* group contained 588 merklands and each of the 360 merklands of Ila itself had to sustain all the year one of the master's household men.   And ' Ilk town in this ile is 2 merk-land and pays yearly at *Beltane* 4 ky with calf, 4 zowis (ewes) with lamb, 4 gees, 9 hennis and 10*s.* silver.'

The assessment in merklands and pounds of ' Auld Extent ' connects the assessment of these island groups with the more agricultural plough-lands, for the plough-land was it seems reckoned as £2 of auld extent or 3 merklands.

	Merklands.		Plough-lands of £2 of old extent.
Lewis	313	=	104
Skye	236	=	79
Mull	612	=	204
Ila	588	=	199
	1749	=	586

In the meantime it is clear that although assessed in merklands and thus indirectly in plough-lands of ' old extent ' the system of ' cuddiche ' or ' night's entertainment ' was still going on.

The only reference to ploughs or plough-lands is the statement that in St. Kilda there were ' no ploughs but spades only.'   Thus although Mr. Cosmo Innes has shown that the unit of the ' auld extent ' of Scotland was probably the plough-land its application to the islands must be regarded as a rough assessment of value rather in currency of Norse origin than proof of an advance in agriculture.

Estates or holdings of land were transferred in the eleventh and twelfth centuries with the fixed food-rents payable by the occupiers upon them. And the property transferred was described generally as of so many *plough-lands*. The rights of the old Gaelic chieftains over large districts had apparently passed into overlordship of the kings—but still under conditions of tribal custom not yet dead.

Thus King Alexander and his Queen could hand over to the Monastery of Scone (A.D. 1115) so many properties each of them with its local name and described as of so many plough-lands. Along with them was given a house (mansio) in each of the cities of Edinburgh, Stirling, Inniskillen, Perth, and Aberdeen, with rights of fishing and the *can et consuetudines* of one ship on the Tay. Also gift was made of *half of the skins pertinent to the king's kitchen and the tenth loaf and cheeses from a large district*, and so on. The king is acting as if he were still a great Gaelic chieftain. His family join with him in his grant. The chieftainship has not lost its tribal family character. And the individual consent of seven local sub-potentates (under the title of ' comes '), identified by Mr. Skene with the seven Earls of Scotland, is added to the charter apart from the ordinary witnesses.[1]   (' Celtic Scotland,' i. 448.)

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[1] The abbey having been destroyed by fire, King Malcolm confirms the details of the charter of his predecessor and adds ' ad lumen ' of the church

   20 solidi de firma de Perth

    10 ,,   ,,   of the mills
      of Perth

Also :—' Medietatem coriorum de occisionibus ad opus regis factis ex aquilone de Tei et dimidium sepi et unctorum earundem occisionum.'

Also ' *Cambesmichel* cum hominibus terris et aquis,' &c.

Also ' *totam decimam* mee prebende et brasii et cani coriorum meorum et caseorum ' from 4 manors named and the tithe of his mills there.

Also the whole tithe of the

Now if following Mr. Innes we may regard the plough-land as that described in the early fragments of Scottish laws, *i.e.* as the *three mark land* or *two pound land* of *old extent* and connect this old extent with something like an assessment of the whole country commuting the food-rents and ' coneveth ' of Celtic custom into a money payment we have an example of not only a general survival of the Celtic food-rents in kind or in their commuted value, but also of their transfer more or less unaltered except by commutation first to the Scottish kings and then by them to the monasteries, with public declaration that the transfer had been made.[1]

No doubt both Northumbrian and Norse influences had been at work upon Gaelic tribal custom guiding

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parish of Scon in ' annona,' *i.e.* in cheeses, fish, &c.

Also liberty to cut wood in the royal forests of all Scotland for the rebuilding of the church, &c.

Also *nativos homines* of the said lands *and their children* except those who had been freed by the canons themselves and with liberty to have at Scon three ministros one smith, one pelliparius, one sutor.

Further from each plough (aratra) of all the land of the Church of Scone every year for their ' coneveth ' at the feast of All Saints a cow and two pigs and four ' clams ' of flour and 10 traves of oats and 10 hens, and 200 eggs and 10 *handfuls of candles* and 4 pounds of soap (nummatas sauonis) and 20 half meles of cheese. Lastly in two other documents Malcolm gives public notice that he has made

this donation to the Church of Scone.

[1] Mr. Skene's comment upon these Charters is as follows :—

' " Coneveth " was the Irish Coinmhedha or Coigny, derived, according to Mr. O'Donovan, from " Coinmhe," which signifies feast or refection. It was the " Dovraeth " of the Welsh laws and was founded upon the original right which the leaders of the tribe had to be supported by their followers. It came to signify a night's meal or refection given by the occupiers of the land to their superior when passing through his territory which was exigible four times in the year, and when the tribe territory came to be recognised as Crown land it became a fixed food contribution charged upon each ploughgate of land ' (iii. 232).

and moulding this development into manorial methods and forms.

The laws of the early Scottish Kings as to land and other things bear the same traces of outside influence. But even though to a large extent the work of Norman lawyers, they bear many traces of local Gaelic custom. Even the so-called ' Laws of the Bretts and Scots ' had to be taken into account as still in some sense in force.

So it is perhaps not surprising if, when we inquire minutely into the structure of the Scottish plough-land which Mr. Cosmo Innes recognises as the £2 unit of the assessment by ' auld extent ' in the time of the Alexanders, we find the combination of Gaelic or Celtic with Norman or Teutonic elements strikingly visible. (Cosmo Innes, ' Scotch Legal Antiquities,' 1872.)

Our knowledge of this plough-land of ' old extent ' rests upon two fragments of ancient Scottish law fixing its area on the basis of the same natural foot with which the Cymric evidence has made us familiar and for an exact local standard of which we had occasion to refer to the ' Assize of King David.' [1]

These fragments, which Mr. Skene considers as applying to a once Gaelic region of Scotland, are as follows :—

<center>*Ye mesur off þe Rude.*[2]</center>

þe rude off lande in baroyis sal conten VI elne þat is to say xvii

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[1] With regard to the date of these documents. In the *Registrum of the Abbey of Aberbrothoc* (p. 163) is a record of a perambulation in 1220 expressly recognising the legal Assize of King David as still in force and (at p. 89) there is a charter which describes two bovates of land as containing 26 acres, *i.e.* 13 a. to the bovate.

[2] Acts of Parliament of Scotland, p. 751 red.

fut off a mydlyn mane, þe rude off þe land in þe burghe mesurit off a midlyng mane sal be xx fut.

The mesuring of landis.

In þe first tyme þat þe law wes maid and ordanit þai began at þe fredome of halikirk and syne at þe mesuring of landis þe plew land þai ordanit to contene VIII oxingang, þe oxgang sall contene xiii akeris. The aker sall contene four rude, þe rude xl fallis. The fall sall hald vi ellis.[1]

According to the first of these fragments the acre *in Baronia* of 4×40 of the 18-foot rod (allowing for the recognised variation in the natural foot ·246–·251) would have a furrow of from 177 to 181 m. and an area of from 31·33 to 32·76 ares. Taking the higher standard of King David we have no difficulty in recognising it as a *half-acre* put into the form of 1×10 of the well-known Irish statute acre, also the customary acre of the Northumbrian and Cumbrian district with a furrow of 256 m. and an area of 65·62 ares.

The importance of this Scottish half-acre with a furrow of 181 m. and its extension over a large Gaelic area is shown by the prevalence of what the books call the *old Scotch mile* of 1810 m., *i.e.* 10 of its furrows in length mentioned in the Report of the Board of Agriculture as prevalent as far north as Ross and Cromarty.

The plough-land according to the other fragment—

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1 Nor was this arrangement of 13 acres to the oxgang and 104 to the plough-land confined to the old Northumbrian district. It was prevalent in Teviotdale and the Merse (Innes, p. 241 and in 16th century note on *Moynet MS. Acts of Parl.* 196 red pages to vol. 1). Mr. Innes (p. 270) thinks that it applied also to Aberdeen, Banff, and Moray. And this may perhaps be confirmed by the statement in County Reports of the Old Board of Agriculture, 1795–1814, that the ' mile ' of Ross and Cromarty was that of 1984 English yards, *i.e.* 1815 m., whilst in the Report of 1820 (Weights and Measures) the mile of Nairn and Moray ' *in the cross roads* ' was ' the old mile of 2640 English yards,' *i.e.* 2413 m. —1½ English miles.

that on ' The Measuring of Land '—contained 8 oxgangs
each of 13 of the acres (or half-acres) *in Baronia*.   It
therefore consisted of 104 of them and would contain
an area of from 3258 to 3407 ares.

It would be difficult from a Gaelic point of view
not to recognise in this Scottish plough-land so described
the double of the smaller of the Brehon tir-cumails,
which on the same standards varied in area, as we have
seen, between 1606 and 1676 ares.   A nearer approach
to correspondence could not have been made in these
acres without making the number in the oxgang 12·8
instead of 13.   The closeness of correspondence is
most obvious when shown in natural feet.   The tir-
cumail contained 2,654,208 square natural feet, while
the Scotch plough-land contained twice 2,695,680
square natural feet.   It would be still nearer the double
of the tir-cumail if this were regarded as $\frac{1}{30}$th of
the square leuga or 2,700,000 natural feet put into
the form of two squares as suggested in the previous
chapter.

Nor could it be passed unnoticed that if Mr. Skene
and Mr. Innes are right in identifying the Scottish
plough-land of these fragments with the areal unit of
40*s.* of the ' Old Extent ' of the Early Scottish Kings
the Brehon tir-cumail would become the *one pound land.*

In other words, consciously or unconsciously, the tir-
cumail would become the areal 40*s.* unit of assessment
of the ' old extent ' of Scotland.

Nor have we yet exhausted the traces of connection
between Scottish and Brehon areas of tribute.

The greater Scottish agricultural area—the *Davach*—
according to the same authorities [1] seems to have been

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[1] Innes, *Scotch Legal Antiquities*, 1872, p. 270.

composed of four of the plough-lands, and if so, it contained in area 13,032 to 13,628 ares, *i.e.* almost exactly $\frac{1}{10}$th of the area of the *greater* Brehon tir-cumail, which contained, as we have seen, 130,152 to 135,721 ares : the same variation of the natural foot being adhered to in both cases.

The closeness of correspondence becomes still more obvious if we substitute for two of the Scottish half-acres the parent acre itself of which they are halves, with its furrow of 256 m., known to-day as *the* Irish acre, for then 2000 of these acres without change of their form of 1×10 would exactly fill the two squares of the greater tir-cumail.

Further light seems to be thrown on these remarkable correspondences between Brehon and Scottish areal units of tribute when the other acre mentioned in the first of the fragments as the acre *in Burgo* is examined. It turns out to be identical with the English statute acre. It is described as 4×40 of a rod of 20 feet of a middling man. This rod on King David's standard (·251) would equal 5·02 m. and 40 such rods would equal 201 m. which is the length of the furrow of the English statute acre. Now it is curious that whilst an odd number of 104 of the acre *in Baronia* was required to make the Scottish plough-land, the *even* number of 80 of the English statute acre already met the requirement, though the second fragment describing the plough-land is silent about it.

Forty English statute acres, consciously or not, equalled in area the smaller tir-cumail. But the closeness of correspondence is best shown by the fact that if the statute acre were turned (as in the other case) into two half-acres of the form of 1×10 with a furrow of

142 m., then 80 such English half-acres, without change of form, would exactly fill the two squares of the smaller tir-cumail.

FIG. 13.

Scottish plough-land.

What then is the meaning of this Scottish plough-land ? The language of the second fragment would point to its introduction from a district which had long been in possession of it under customary laws which had ordained the ' freedom of holy kirk.' Its wording has a manorial ring about it, and taken in

connection with the 8-oxen plough-team it seems to suggest the importation into a hitherto pastoral country of agricultural methods for long in customary use in the neighbouring Northumbrian district where both of the acres mentioned in the fragments were known.

Finally, as an agricultural unit, I think we may identify the Scottish plough-land with that of the two field systems described in Fleta thus :—

> There should be 160 acres to the carucate, half for fallow, half for winter and Lent sowing, *i.e.* 80 acres in each of the two fields.

Such a *carucate* would correspond with the Scottish plough-land and consciously or not each of its two halves would correspond with the lesser tir-cumail of Brehon custom. I do not wish to press too strongly the re-markable correspondence between Brehon and Scottish areas of tribute as proving or pointing to direct con-nection. They may have been independently arrived at from itinerary measures common to both. But both itinerary and areal measures seem to keep throughout within the range of local Celtic custom and bear the primitive mark of being founded, not upon any imported fixed standard, but rather as part of an inherited tradi-tion of common methods of measurement based upon the natural length of the thumb and foot and step of the ' middling man.'

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CHAPTER IV.

THE UNITS OF TRIBUTE AND ASSESSMENT
OF THE DOMESDAY SURVEY.

I. THE CORNISH 'GREAT AGER' OR CARUCATE.

WE have now to consider the units of tribute and assessment of the Domesday Survey—the Cornish 'great ager' or carucate and the hide.

In the Domesday Survey there is direct reference to a Cornish '*great acre*' or carucate as a fiscal unit, but it is not easy and perhaps it may not be possible to find out precisely what it was. In the Exon Survey there are several instances in which the phrase is used, '*ager terre, hanc potest* 1 *caruca arare.*' It therefore was a 'plough-land,' but cases also occur in which the acres and the number of teams which can plough it do not correspond. So that we are left in doubt as to its area and with something more than a hint that its area was not always the same.

Mr. Round long ago pointed out passages in the 'Testa de Nevill' from which at first sight one might obtain information as to its area.

At p. 204 of the 'Testa de Nevill' is an extent of the Pomeray manor of *Tregony* in Cornwall. And in the description of this demesne land is the following statement :—

In dominico ii acras cornubienses continentes ii caruc' cornubienses, que valent per annum xl⁸.

And in the list of *Libere tenentes* holding at that date by military service, the phrase so many *acræ cornubienses* containing as many *carucatæ cornubienses* occurs again and again. There are Cornish *half-acres* containing Cornish *half-carucates* and also *ferlings* containing a fourth part of a Cornish carucate.

There is also in the ' Testa de Nevill ' (p. 201) a list of the 146 *Libere tenentes* of the Bishop of Exeter in Cornwall holding ' acres ' which from comparison with the holdings in the Domesday Survey (120 b) and the amount of their services and rents must be ' *great acres.*' They are also divided into *ferlings*, but we are nowhere told how many ordinary acres they may have contained.

In the absence of any information given for Cornwall of the number of acres in the great acre or carucate or in its ferling we might perhaps at first sight be tempted to infer that as in the Extent of *Beri*, a Devonshire manor of the same Pomeray estate, it is stated that there were 16 acres to the ferling, so there might be 64 acres in the Cornish carucate. But this inference is doubtful, for in the Extent of another Pomeray manor in Devonshire (p. 187)—*Stockelegh Pomeray*—the ferling seems to have contained 32 acres[1] which would give 128 acres to the carucate. Nor is there any mention in the Extents of these Devonshire manors of the existence of the Cornish great acre or carucate.

[1] The list of free tenants consists of 7 holding *each a ferling* and each paying 5*s.* per annum and 12*d.* pro servicio ; 1 holding a ½ ferling paying 2*s.* 6*d.* per annum and 6*d.* pro servicio ; 2 holding 8 *acres* each paying 15*d.* per annum and 3*d.* pro servicio ; 1 holding 4 *acres* paying 7½*d.*

We remain therefore with no certainty as to the number of acres in the Cornish great acre or carucate, and even if the number of acres were known we should still have to ask what acres they might be, whether English statute acres or Cornish or Devonshire customary acres.

Lastly, there is reason to believe that the area of the Cornish acre or carucate varied. Even in the Exon Survey, as already mentioned, it *was not always described as to be ploughed by the same number of carucæ.* And when we come to the statements in the ' Caption of Seisin ' 11 Ed. III. describing the manors of the Duchy of Cornwall, we find the number of English acres in the Cornish great acre varying considerably and justifying the statement of Carew in his ' History of Cornwall ' (p. 36) that whilst ' commonly 30 acres make a farthing land and nine farthing lands a Cornish acre, the rule is overruled to a greater or lesser quantity according to the fruitfulness or barrenness of the soil.'

On the whole therefore it seems better to regard the Cornish great acre or carucate as of varying and uncertain area, and thus, for our purpose, out of court.

II. THE HIDE.

The hide, however various it may have been or may have become, as a unit of assessment ' ad geldum,' when considered as an actual agricultural area ' ad arandum ' came to be generally reckoned as containing four virgates or yardlands.

In a period and in districts of settled agriculture, the hide had thus become almost identical with the carucate, connected with the ' caruca ' or team of eight oxen,

yoked four abreast. The virgate in the same way had normally become the subordinate holding which con-tributed a pair of oxen to the common plough-team of the hide. Further, there was at least a dominant tendency to regard the virgate as a holding of normally 30 acres, making the normal hide an area of 120 acres of arable land.

Now 120 statute acres (equal in area to 4855 ares) are so closely equivalent in area to 100 Cornish custom-ary acres (4820 ares), that we may reckon them alike. And as the length of the furrow of the Cornish acre is $\frac{1}{10}$th of the leuga, the hide of 100 Cornish acres would be $\frac{1}{10}$th the area of the square leuga, and like the Cornish acre retain the shape of 1×10.

Hence, when the clause in King Ine's laws which fixes the ' feorm ' of the unit of ' 10 *hides to fostre* ' or food-rent, is considered and connected with the numerous gifts of 10 hides or multiples of this unit by King Ine to the monasteries, the correspondence in area of the 10 hide unit of food-rent or tribute with that of the square leuga becomes remarkably significant.

CHAPTER V.

THE origin of the hide rests still in obscurity. But besides this remarkable relation to the leuga the question remains what, apart from its normal area, may have been its possible economic relation to the Welsh and Irish units of tribute examined above. It seems worth while before dismissing the subject to try to sum up the results of the foregoing inquiry as to these units, by way of realising the lesson to be learned from them and their relation to the hide viewed like them as an economic unit and from a tribal point of view.

Regarding the Celtic units or areas of tribute in their relation to each other, perhaps the most remarkable fact may be the association both in Ireland and Wales of the single plough-team with the maintenance of a herd of 25 cows and the connection of these combined elements with the tribute-paying group and area. This was not merely a chance result of Welsh custom. In Wales it was traditional in both Cymric and Goidelic districts. In Ireland it cropped up again in connection with both the tir-cumails.

The small tir-cumail was the traditional area of good pasture allotted practically to the same typical herd, and the cumal of 3 cows was the annual return for the grazing of it. Admitting the variation within limits

in natural measures, we have found that Dunwal's maenol of North Wales contained nine of these smaller tir-cumails, the Dimetian tref four of them, and the Scottish plough-land of ' auld extent ' two of them.

Here then keeping within the lines of Celtic custom itself we find a direct connection between the unit of gwestva or tribute payment and the economic group with its typical plough-team and herd of 25 cows, and also we find that at any rate in Wales the normal areas occupied by this economic group, with its plough-team and herd, and charged with the payment of the tunc pound, turn out when examined to be divisions of the square milltyr of ' the great measurer ' who is stated in the Venedotian Code to have measured the ' island ' for the purposes of the ' mal ' or tribute.

It is further worthy of remark that in nearly all cases the divisions are such as when geometrically realised take the prevalent form of two squares, as do also both the Irish tir-cumails.

At any rate (whatever their origin) the independent evidence with regard to the tribute-paying areal units of Ireland and Wales leaves us with the impression that, however many details remain in doubt, we have been dealing substantially with realities and with widespread results of early Celtic custom common to both sides of St. George's Channel.

With these Celtic examples in view we may recur once more to the *Hide*. Whether of foreign or of Celtic origin and whatever its subsequent Saxon and manorial relations may have been, we surely shall not be far wrong in regarding it as having grown out of an economic unit for payment of food-rent and tribute more or less like those of the Celtic group though probably belonging

to a more advanced stage of agricultural and economic life.

The possibility must be admitted that it may have been to begin with, like the Irish plough-land and the Welsh trefgordd, the normal unit associated with the single plough in an agricultural rather than pastoral district under economic conditions widely different from those of a mainly agricultural population settled in village communities with several ploughs and plough-teams engaged in permanent open field husbandry with scattered holdings in yardlands.

We seem even to get glimpses of the stages by which the economic change from pastoral to agricultural conditions may have come about in the gradations of area in different districts in Wales. We trace in Wales what seem to be survivals of gwestva payments which go back to tribal conditions before the Norman or Saxon Conquest. The areas differ, but the commutation into the tunc pound of the gwestva payments is the same throughout.

Here again coincidences may easily deceive, but Mr. Maitland himself, in the concluding portion of his ' Domesday Book and Beyond,' would not let us rest in regarding the hide merely as a plough-land of 120 acres connected with a team of 8 oxen without further suggesting that it was also a ' *pound-paying unit.*' After giving the figures of the *valets* of twenty counties in the Survey he adds : ' No one can look along these lines of figures without fancying that some force, conscious or unconscious, has made for *one pound one hide* ' (p. 464).

Whether this be so or not (and it must be allowed that it is by no means a universal rule) in passing from the Welsh and Irish to English units of taxation it will

be hard, I think, when we set them in a row, not to recognise that the hide and the Scottish plough-land might well find a natural place at the end of the list.

We cannot but recognise, I think, that the dwindling figures of area very instructively mark not only the passage from a mountainous to a more level district, but also a growing preponderance of the arable over the pastoral element even in Wales till the tribal ' co-aration of the waste ' had at last to give place to the settled agriculture of a village community gradually formed by the aggregation of homesteads and plough-teams for protection and convenience in the advanced economic stage under which it had become the typical form of rural occupation.

The following table can hardly from this point of view fail to be instructive :—

	Area	English Acres	Reserve for pasture after 120 acres arable
Howell's Venedotian maenol .	37,300	930	810
Dunwal's ,, ,, .	13,886	347	227
Irish single plough-land . .	11,370	271	151
Gwentian trev	8,887	222	102
Dimetian trev	6,172	154	34
Domesday hide and Kentish sullung	4,855	120	—
Scottish plough-land . . .	3,258	80	—

Bearing in mind that under both Irish and Welsh custom the herd of 25 cows was deemed to be the proper pastoral associate of the single plough, and further that not only in the case of the English hide and carucate, but also even in the Irish case stated in the ancient poem, the area required for arable seems by custom to be reckoned as 120 acres to the plough—it is clear that there must have come a time when these traditional figures would be found to be conflicting. Let us deduct

from the area of the £1 paying units of food-rent or
tribute 120 acres for the arable and in a third column
state the number of acres of pasture left for the herd of
cows over and above the stubbles and fallows of the
area actually ploughed.

It surely is instructive to trace the extent of the
change which the character of different districts or
stages of tribal growth may have made in the complex
economic unit associated with the single plough and
responsible for the customary food-rents, commuted
into the tunc pound.

One is disposed to think that in the case of Howell's
maenol of four trefs paying the tunc pound we ought
possibly to regard it as an innovation of exceptional
character.   If so, to avoid exaggeration, we may reckon
that in North Wales, outside the 120 acres of arable,
something over 200 acres would be left besides the
stubble and fallows for the pasture of the herd of 25
cows and the oxen of the plough-team.   In the Irish
plough-land of the Brehon poem about 150 acres were
apparently left over in the same way for the pasture of
a similar herd and the oxen.   In the Gwentian district,
bordering on, if not including, the rich plain of the
Severn Valley, something over 100 acres were con-
sidered enough to be left over for the pasture of a similar
herd; whilst in Dimetia something like 40 acres were
considered enough.

And then, at last, we come to the contrast afforded
by the hide.   Let us examine more closely what it was
from the same point of view.   To each of its four yard-
lands the typical outfit was something more than the two
oxen for its share of contribution to the plough-team
of eight.   In the ninth century will of Abba (Birch,

'Cart. Sax.,' 412) the gift of a half-swulung (two yard-lands) carried with it 4 oxen, 2 cows, and 50 sheep, *i.e.* 8 oxen, 4 cows, and 100 sheep to the hide. According to the tenth century ' Rectitudines' 2 oxen, 1 cow, and 6 sheep were allotted to the yardland. According to the twelfth century Glastonbury Inquisition, 2 oxen, 1 heifer, and 1 cow and 6 sheep were so reckoned.[1]

So that, marking the preponderance of agriculture over pasture, the typical herd associated with the hide or plough-land apparently all over England as compared with Ireland and Wales has dwindled down from 25 cows to 4 cows besides the 8 oxen of the plough-team.

Surely this means that whether the hide as an assessable unit be regarded as of foreign importation or as a Celtic survival, its dwindled herd and restricted area mark very clearly the line of distinction between the pastoral stage of tribal life of the West and the settled agriculture of the village system of the East of Britain, already noticed even by Cæsar.

Returning to the evidence of the Domesday Survey, having translated the areas of the series of plough-lands into English acres, it is easy to compare them with the maximum number of acres possible to each actual Domesday plough-team as given for the various English counties in Mr. Maitland's table. I have ventured to transfer his figures to a map to facilitate comparison. If we compare the Gwentian tref of 222 acres with the figures for the adjoining English counties and the larger Venedotian areas with those of the forest districts of Shropshire, Staffordshire, and Derbyshire, the comparison, I think, is instructive.[2]

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[1] Roxburghe Club ed. 1882.

[2] Maitland, *Domesday Book and Beyond,* p. 402.

Fig. 14.

Number of acres per plough-team. Sloping figures represent acreage divided by
actual plough-teams in Domesday Survey. Upright figures represent acreage
divided by estimated teamlands.—Maitland, *Domesday Book and Beyond,* p. 402.

These figures show clearly that already at the time of the Domesday Survey the number of plough-teams in the counties of Central England could not have been doubled without curtailing the 120 acres allotted to each, whilst naturally the two districts where the plough-teams absorbed the smallest proportion of the total acreage were the two great forest districts of Sherwood and the Weald.

Thus in passing from the Irish and Welsh units of tribute to the *hide* we seem to have silently turned over an important page in economic history.

The Celtic plough-team of 8 oxen keeps its place. It survives the great economic change and is the connecting link between the old and the new conditions. If the hide was ever itself a Celtic unit of tribute, associated like the others with the plough-team of 8 oxen, then it may be that the hide carried the plough-team with it as the new page in economic history was turned over.   But if the hide came into Britain with conquerors from abroad, Saxon or other, then whatever it may have been originally as an economic unit or as a unit of assessment, it must have met in Britain with strangely tenacious traditions of earlier Celtic custom.   It must have had to succumb so far to their influence as to have been forced to reshape itself and its divisions upon the basis of the 8-oxen plough-team.   In either case this plough-team accompanied and survived the turn over of the economic page.

However this may have been, we have to recognise that the Celtic team of 8 oxen originally used in the Welsh tribal ' co-aration of the waste ' has become the great manorial plough-team with which the tenants of a manorial estate do service in ploughing on the lord's

demesne. If we are to look upon this from a tribal
point of view, it seems to suggest a new method
of paying tribute to a chieftain who has either him-
self become a manorial lord or been supplanted by
one.

When and how this change was effected from tribal
to manorial conditions in the South-Western parts of
Britain we do not know. Whether the result of con-
quest or of gradual agricultural evolution we cannot
tell. But if in the days of Ine weekwork on the lord's
demesne had already come to be regarded as a semi-
servile method of paying gwestva or food-rent we may
judge that the passage from tribal to manorial conditions
may have been the result of conquest. And yet as in
the structure of the hide the 8-oxen plough survived as
the connecting link between tribal and manorial con-
ditions, so possibly also the translation by Bede of the
Saxon word *hide* or *hiwisc* into the Latin *familia* may
serve a somewhat similar purpose. May there not be
found in the word *familia* a reminiscence of something
like the Welsh trefgordd—the tribal group of occupants
of the pound-paying tref with their single 8-oxen plough
and their normal herd of cattle—rather than the
allotment or family holding of the single Saxon
ceorl ?

However this may be, we seem to stand upon firm
ground when, going back to King Ine, we find in his unit
of ' 10 hides to fostre ' reminiscence of the tribal system
of food-rents, whilst in his mention of *yardlands* we
recognise an indication that the hide had already for some
purposes become connected with the 8-oxen plough-
team.   And thus we are led back once more to the fact
most relevant for the moment to our present purpose,

viz. that the normal area of the hide and ' carucate ' reckoned as 120 statute acres seems to have been $\frac{1}{10}$ of the square leuga and the 10 hide unit of Ine's laws therefore equal in area to the square of that great Gallic itinerary measure.

PART II.

THE OLD BRITISH MILE.

NOTE.—In the annexed map I have tried to show the length in metres of the 'Old British mile' as calculated from the 'vulgarly computed' and 'measured' distances in statute miles in Ogilby's Itinerary or Road Book. The Gallic leuga of 1500 Roman paces was 2220 metres. The English statute mile 1609 metres.

THE examination of the Welsh areas of tribute led to the conclusion that they were closely connected with the system of itinerary measures described in the Venedotian Code, and traditionally attributed to the period preceding the Saxon Conquest.

The great itinerary measure was the *milltyr* of 1000 'lands' or strips for ploughing. The breadth of the land or erw was 9 single steps of 3 natural feet, making the milltyr 9000 single steps or 4500 double steps or paces.

Reckoning the natural foot of an average middle-sized man at ·251 m., according to the incidental evidence of the laws of King David of Scotland, the length of the double step or pace of six such feet would equal 1·506 m. and the milltyr of 4500 paces would measure 6677 metres.

The Gallic *leuga* was reckoned by the Greeks and Romans as 12 Greek stades of 185 m., or 1500 paces

of 1·48 m. according to Roman standard, and thus equalled 2220 m. The Welsh milltyr of 4500 paces would divide into three such leugæ of 1500 paces or 2226 m., the variation in actual length expressed in metres being obviously within the limits of the inevitable variation in natural measures.

If we had nothing but this evidence of the Welsh Codes to guide us, it would be difficult not to raise the question whether after all the leuga of 1500 natural paces may not have been the ancient customary itinerary measure of Britain as it was that of Gaul, *during* or even *before* the Roman occupation.

But there is other evidence of an altogether independent kind from which I think the same inference may be drawn. It has long been known that when in quite recent times distances on the roads came to be systematically ascertained from actual measurement by the wheel in statute miles, the figures were found to be very much larger than those of common computation as recorded in the old itineraries and on the old milestones.[1]

It may be worth while to consider the meaning of these discrepancies. It will be convenient to begin with the fact that there still exist in Yorkshire (and probably elsewhere) old milestones the distances marked on which are obviously based on a mile much larger than the statute mile.

From information kindly furnished to me by a local

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[1] If we may trust the Encyclopædias no one seems to know when the statute mile came into obligatory or common use on the roads. But the reader of the article on '*Mile*' in the *Penny Cyclopædia* will find a very fair statement of the discrepancy already noticed between the figures of modern measurement and those of the old itineraries.

antiquary [1] I have been able in 19 cases to compare the distances recorded on old milestones with the actual distances in statute miles carefully obtained from the Ordnance map.

The several distances marked on the milestones being in even miles, necessarily are not exact, but a comparison of 117 milestone miles covered by them with the 162 miles of actual statute mileage ought to yield a fair average result. 162 statute miles of 1609 m. = 260,658 metres, and divided by the 117 milestone miles the average milestone-mile becomes one of 2221 m., *i.e.* the Gallic leuga of 1500 paces.[2]

Nor does the value of these figures rest here. If we divide the list into smaller divisions, we may get some practical guidance as to the extent of the variations which may be expected in the average length of a customary mile derived from distances handed down by tradition or locally computed by the number of paces of an average walker, 1500 paces being reckoned to the mile.

Divided into five groups as they happen to come in the list, the average miles vary from 2104 to 2308 m. We may therefore expect that the old customary mile will be found to easily vary more or less than 100 metres above or below the normal 2220 m. of the Gallic leuga of 1500 paces reckoned upon the Roman standard. It is true that the unit of itinerary distance is called a ' mile,' but the evidence of the milestones certainly

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[1] Mr. J. J. Brigg, of Kildwick Hall, near Keighley, Yorkshire. Since published ; see ' Some Old West Riding Milestones ' in *Yorkshire Archæological Journal,* Vol. xxii.

[2] A further list, since kindly added, covering 83 old milestone miles and 121½ statute miles, brings an average of 2355 for the old milestone mile.

would lead us to regard what is called ' a mile ' as a measure of 1500 paces rather than a ' mille passuum.'

In attempting to trace back the mile of the old milestones little help can be got from the Statute Book.

The first mention of what seems to be the statute mile is in reference to building restrictions in a statute of 35 Elizabeth in which the ' mile ' for the special purpose is described as 8 furlongs of 40 perches of $16\frac{1}{2}$ feet, as in the case of what is now known as the ' statute mile.'

Nor are we informed when the present statute *foot* as a fixed standard measure came into use.

On the other hand the ancient use of the *leuga*, rather than the mile, rests upon substantial evidence. Whatever doubts may arise as to the exact actual length in early times of the *perch* or the *pace* or foot we have historical evidence of the use of the leuga on this side of the Channel maintaining its ancient structure as 12 *stades* or 1500 *paces*—as in Gaul.

There is first the evidence of the Domesday Survey in which the extents of woods, &c., are described not in miles but in ' *leucæ* ' of 12 ' *quarantenæ*.'

There is also the thirteenth century evidence of Walter of Henley, who, in order to show that an acre of land could be ploughed in a day, calculated the distance to be travelled by the plough-team in doing it, not in miles but in *leagues of* 12 *furlongs of* 40 *perches of the King's perch* ' *of* $16\frac{1}{2}$ *feet*.   ('Husbandry,' ed. Lamond, 1890, p. 9.)

What the length of the King's perch may have been we do not certainly know, for still there may be doubt as to the length of the *foot*.   But the fact is important that supposing the foot to have been the modern statute foot of ·305 m. the league of Walter

of Henley's statement would be 2400 metres in length, instead of the normal reckoning of 2220 m. on the Roman standard.

It would appear, however, from 'Harrison's Description of Britain' prefixed to the 1577 edition of 'Holinshed's Chronicle,' that the standard of the foot was not yet fixed even at that date.[1] The author gives in a diagram the exact length both of the *English* and of the *French* foot. And as his French foot correctly measures ·325 m., *i.e.* the French standard foot, it is remarkable that his English foot should measure only ·298 m. (*i.e.* the length of the Roman foot) instead of ·305, the English standard foot.

Walter of Henley's league of 12 furlongs of 40 perches of the King's perch of 16½ feet (and presumably also the Domesday Survey league of 12 quarantenæ, if founded on the same King's perch) may therefore have measured 2344 m. instead of the 2220 of the Gallic and Roman standard.

But however hazy Harrison may have been with regard to statute miles and feet, what is more to our purpose is that he was quite clear in his knowledge of the existence of an ancient well-known customary measure which he called ' *the old British mile* ' and that it was a mile of 1500 paces, though he was probably unconscious of the fact that if the standard of the paces were the same the mile would be identical with the Gallic leuga. His words are these : —

> As for the old British mile that includeth 1500 paces English, it shall not greatly need to make any discourse of it, and so much the less sith it is yet in use and not forgotten among the Welsh men, as Leland hath noted in his Commentaries of Britain.

Moreover, he added to his treatise a copy of a

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[1] The later editions omit the information here given.

valuable Itinerary in which the distances (apparently unconsciously to him) when carefully examined seem to be given in the *old British mile* of 1500 paces and not in the statute mile.

This valuable Itinerary is headed 'How a man may journey from any notable town in England to the City of London or from London to any notable town in the realm.'

It is not known who was its author. Commencing as it does with ' *The way from Walsingham to London,*' it may well go back to the days when pilgrimage was the most typical form of travel, and the pilgrim the typical traveller.

But what is most to our purpose is the fact that when *Ogilby*, nearly 100 years later, at the command of Charles II. in 1675 made ' *an actual survey and mensuration by the wheel* ' he found that the actual distances in *statute miles* exceeded very largely those recorded in Harrison's Itinerary.   (Ogilby's ' Traveller's Guide,' London.)

Where the routes coincided he adopted Harrison's figures, calling them the distances by ' *vulgar computation.*'   In his celebrated work he records for each route (1) the direct ' *horizontal distance* ' (as the crow flies) ; (2) ' the *vulgar computation* ' ;   (3) the actual ' *dimensuration in statute miles.*'

His total for the direct routes out of London extending in all directions as far as Berwick and Carlisle, St. David's, Holyhead, and Land's End, and also a good many direct shorter routes, were :—

As the crow flies	3781 statute miles.
By ' vulgar computation ' . . .	3507 miles.
By actual measurement . . .	4536 statute miles.

These figures would make the average customary

mile 2069 m. But Ogilby himself became conscious that as these direct routes out of London passed beyond the London district the difference between the figures of vulgar computation in Harrison's lists and the measured mileage in statute miles became greater than was the case within that district.

In order to test the result of this fact I have roughly separated the London ends of the longer routes and the shorter direct routes out of London from those beyond the London influence. The separated figures work out thus :—

	By vulgar computa-tion.	By measure-ment.	Making the average computed mile.
For 24 cases in London district .	1130	1355	1928 m.
For the remainder of the routes .	2377	3181	2152 m.
	3507	4536	

Thus the average customary mile on the country ends of Ogilby's long direct routes becomes raised by this somewhat rough division from 2069 to 2152 m.

Passing from the direct routes out of London, Ogilby gives in two further divisions particulars of what he calls cross roads. He has no longer Harrison's figures to assist him, so that presumably the figures of ' vulgar computation ' on these cross roads were the result of local replies to his own local inquiry. His figures are as follows :—

Group No. 1. { As the crow flies . . 2019 ; By vulgar computation . 1831 ; By measurement in statute miles . . . 2505 } Making the customary mile of computation } 2201 m.

Group No. 2. { As the crow flies . . 505 ; By vulgar computation . 475 ; Measured in statute miles . 636 } Making the customary mile . } 2152 m.

From Ogilby's and Harrison's figures taken together
the general result seems therefore to point to if not
to prove the prevalence throughout the country districts
of England and Wales of a traditional customary mile
very closely resembling the Gallic leuga of 1500 paces
or normally 2220 m. in length.

But the problem can hardly be stated quite so simply
as this.   For besides the shortening of the computed
mile in what may be spoken of as the London district
there are exceptional variations in some other special
districts which may mean disturbance .from without,
and thus have historical interest.

An examination of the figures on the map will show
that in Norfolk and Suffolk and down the Icknield Way
as far as the rich Aylesbury valley, under the chalk
down of the Chiltern range, the average computed mile
rises to something like 2400 m., thus roughly corre-
sponding with the league of Walter of Henley's ' King's
perch of 16½ feet,' *i.e.* 1½ English statute miles.

Then again in the figures both of Harrison and
Ogilby on the northward course of the route from
London to Cockermouth and Carlisle there is a distinct
rise in the length of the computed mile as *Newcastle-
under-Lyme* and *Warrington* are approached, and then
a sudden drop in the figures to 1768 m. *all through
Lancashire*, the higher figures being resumed again
from Lancaster to Kendal and on to Carlisle.

At this moment I am not attempting to explain
these variations.   I am only pointing them out.   They
may have historical importance or not.

But as a matter of caution it may at least be well
to consider how far (except in the case of the London
district and that of Lancashire) these variations exceed

what might fairly be expected in distances measured by the natural methods on which the computed figures must have been based.

It seems most probable that the distances by ' vulgar computation ' must have been arrived at either by the time commonly taken to travel the distance between the two places or at best by counting the number of steps or paces of an ordinary walker. Then, again, the steps and paces even of the same walker would vary with the uphill and downhill of the route and between the straightforward travel on a well-made road and the irregular stepping on a packhorse track.

If the normal mile of 1500 paces, *i.e.* $1\frac{1}{2}$ miles of Roman standard, was 2220 m. the single pace of the walker would be 1·48 m. The mile of 2400 m. would be covered by 1500 paces of 1·6 m. The difference in the pace in the two cases would be little more than 4 inches, *i.e.* 2 inches in the step.

Again if in some cases the computed mile sank to 2100 m., the difference would be covered by a drop of little more than 2 inches in the pace or one inch in the step.

Recognising that in the computed distance we are dealing with natural measures and methods I think it may be fair provisionally to conclude that if no other explanation can be found for them there is nothing in the variation of the miles of ' vulgar computation ' in different parts of England to lead us necessarily to doubt Harrison's statement that the ' Old British mile ' was of 1500 paces or that allowing for local differences in the pace this old British mile and the Gallic leuga were identical.

Even in the case of the shorter computed miles of

the London district the difference in the pace would only be $7\frac{1}{2}$ inches and in the single step only $3\frac{3}{4}$. Or the diminution in computed distance might be the result of the formation of better and straighter roads required by the increasing traffic as the metropolis was approached, and resulting naturally in a lengthened step of the walker. So that we may well take warning that too much must not be made of differences in the figures which, after all, in no part of England sink at all nearly to the statute mile.

Without claiming absolute accuracy in the attempt I have made to place on the map the length of the customary mile of computation from a dissection of Ogilby's figures, I think the general diffusion all over England of a computed mile hovering round the Roman estimate of the length of the leuga of 1500 paces at 2220 m. will be accepted as pointing very strongly to the prevalence of this great historical itinerary measure in Britain as well as in Gaul.

Before passing from Harrison's and Ogilby's Itineraries it may be worth while to recur to the York-shire milestones. Harrison's route from London to Richmond passes through the same district. His route from Halifax through Keighley and Skipton to Carleton, included 34 computed miles against $47\frac{1}{2}$ statute miles, making the customary mile of the district 2240 m., thus so far incidentally confirming the evidence of the local milestones.

There is also another route the figures of which may perhaps have a special interest.

The Itinerary of Antonine gives the distances on the few British routes included in it, seemingly in Roman miles. There is no appearance of reference to

any other mile than the Roman ' mille passuum.' Nor
do the totals of each route which can be identified in
detail suggest any other. They never, I think, fall
short of the distance as the crow flies, as those of the
' vulgar computation ' constantly do. They seem very
fairly to represent distances in Roman miles of 1000
paces where the position of the stations can be identified.

Now if there could be any district where one might
expect the Roman mile to have become rooted in the
local mind by common acceptation during the centuries
of Roman rule it surely must have been that in the
neighbourhood of the Roman Wall.

Quite independently of Harrison, Ogilby gives the
details of the route along the Roman Wall from
' *Tinmouth to Carlisle* ' as follows : In total—

As the crow flies	59 statute miles.
The vulgar computation . . .	50 miles.
Measurement in statute miles . .	69 miles 5 furlongs.

The details are as follows :—

	Computed.	Measured. Miles.	Measured. Furlongs.
From Tinmouth to Newcastle .	7	9	2
on to Ovingham .	8	11	7
,, Hexham .	8	10	4
,, Haltwesel .	10	14	7
,, Chapelbourn .	6	8	2
,, Corby . .	7	9	6
,, Carlisle .	4	5	1
	50	69 miles 5 furlongs.	

From these figures the resulting customary mile
would be 2236 m. Could there be a more striking
instance or illustration pointing to the fact that down
to the sixteenth and seventeenth centuries the old
British mile of popular customary reckoning was not

the mile of 1000 paces, but a leuga of 1500 paces like that prevalent in ancient Gaul ?

There remains the question how far other evidence exists filling up the gap between the Itinerary included in Harrison's ' Description ' of 1577 and that of Walter of Henley and the Domesday Survey.

In the first place the Itinerary published in 1577 in Harrison's ' Description ' is only a copy of one already known at the time; for in 1579 a French guide-book was published in Paris for the use of French travellers in England, and it contained a copy of most of the chief routes taken from the same source as Harrison's with precisely the same figures, except in a few cases of evidently accidental errors in copying. In some of these the French copy is clearly the correct one, showing that the French copyist had access to the original source and was not copying Harrison.

There can be little doubt that *Leland* had something to do with the common source. Henry VIII. had instructed him to travel and to collect materials, and wherever he went, mostly on horseback, he recorded the distances in his note-book with other information. When he arrived at an important place he apparently inquired what were the distances thence to the various towns all round, and the answers he received were evidently in old customary miles as locally known. When, for instance, he arrived at Worcester he made the following notes (*inter alia*) in his note-book, of what he had learned as to the distances from Worcester of places within 20 miles round.

		Leland's miles.	Now reckoned locally in statnte miles.
Hereford	. .	20	26–28
Ludlow .	. .	20	30
Gloucester	. .	19	26

		Leland's miles.	Now reckoned locally in statute miles.
Evesham	.	. 10–12	16
Alcester	.	. 12	17
Bewdley	.	. 12 (long)	15
Tewkesbury	.	. 12	16
Bromsgrove	.	. 12	13
Winchcombe	.	. 18	21
		———	———
9 distances	.	137	182

—making the customary mile 2138 m.

The old British mile of 1500 paces was evidently the ordinary itinerary unit of local usage. Through the kindness of the Rev. J. M. Wilson, Canon of Worcester, I am furnished with independent confirmation of this. I am able to give the following distances from the monastery of the churches whose livings belonged to the Priors of Worcester, as stated in the MS. A. xii. in the Cathedral Library.

Milliaria as reckoned in 1516-1532 A.D.				Now reckoned locally in statute miles.
Wolverley	.	.	13	17
Tibberton	.	.	3	5
Himbleton	.	.	5	$7\frac{1}{2}$
Stoke Prior	.	.	8	10
Cropthorne	.	.	9	12
Overbury	.	.	10	17
Sedgebarrow	.	.	12	18
Lenchwick	.	.	12	15
			—	———
			72	101

—making the customary mile 2257 m.

It seems to be clear then that the mile of local knowledge and reckoning was the mile of 1500 paces and not the Roman or other mile of 1000 paces. The reader need not be troubled with further details. It is enough to say that the results of Leland's figures throughout his travels, where I have been able to verify them, correspond very closely with those of the Itinerary of 1577—thus carrying the ' old

British mile ' of Harrison back another half-century, to
1535–1543 A.D.

Still further back than Harrison and Leland the
Itinerary of *William of Worcester* (A.D. 1478) affords
independent evidence chiefly with reference to West
Wales.   Travelling in Devon, Somerset, and Cornwall,
as far as I have been able to judge somewhat roughly
from the map, he reckons stages covering about 355
statute miles, as 250 milliaria, so making the customary
mile of West Wales 2285 m.   Here again, hidden within
the average, lie considerable variations in the details
of the several journeys included in it.

	W. of W.	Stat. miles.		
Somerset .	. 41	54	making the average mile	2118 m.
			of computation	
Devon	. 38	59	,,	2490 m.
,,	. 55	72	,,	2106 m.
Cornwall .	. 77	111	,,	2319 m.
,,	. 23	34	,,	2380 m.
,,	. 16	25	,,	2514 m.

I must, however, admit the difficulty of following
the distances in Cornwall so as to translate them with
exactness into statute miles from the map.   The above
figures must therefore be taken with this reservation.

Of the Domesday Survey, with its 12 quarantenæ of
40 poles, we have already spoken.   With regard to the
Saxon period we seem to be thrown back upon the evi-
dence of the pre-Domesday Venedotian Code of the tenth
century, which, whilst describing the areas of tribute
as closely connected with the milltyr and the milltyr itself
in natural measures, throws back its traditional use
to a period before the Saxon invasions.   Lastly, when
we find in the Brehon tir-cumails, also described in
terms of natural measures, evidence of a community of

agricultural measures possessed alike by Irish, British, and Scottish peasantries, the evidence throws back the common use of the milltyr and the leuga historically to a very early date. And thus brought back to the point from which we started we may let the question of the identity of itinerary measures in ancient customary use in Gaul and Britain rest for the moment, to be taken up again when the customary acres on both sides of the Channel have been examined.

NOTE :—Mr. Petrie in his article on Weights and Measures in the *Encyclopædia Britannica,* considers that the Belgic foot of the Tungri (·333 m.) passed over as a building foot into Britain and entered into the old English itinerary measures, which he considers were based upon the furlong of the statute acre of 600 Belgic feet. Thus :—

foot   ·333 m.
yard   ·999
fathom   1·998
chain   19·98 =   20·1 m.
furlong   199·8 =   201 m.
mile   1998 = 2010 m. = old
                            English mile.

For the 10-furlong mile he refers to his article in *Proc. Roy. Soc. Edin.* (1883–4).

In this way he considers that ' we can restore the old English system of long measure from the buildings, the statute prohibition, the surviving chain and furlong, and the old English mile shown by maps and itineraries,' and adds that such ' a regular and extensive system could not have been put into use throughout the whole country suddenly in 1250.' Hence he favours the view of its Belgic

' origin.' But why the perch should be divided into 5½ statute yards the Belgic origin does not explain.

The length of the Belgic foot of the Tungri is not in dispute, it is described by Hyginus as 18 digits of the Roman foot and is in fact the Greek foot of 4 natural palms. And if the evidence for the 10 furlong mile were complete, this ' old English ' mile of 1998 to 2010 m. would perhaps afford a Belgic explanation of the itinerary computed miles of the London district.

But Mr. Petrie goes on to say that the ' *Gallic leuga* is a different unit, being 1·59 British miles by the very concordant itinerary of the Bordeaux pilgrim. This appears to be the great Celtic measure as opposed to the Old English or Germanic [? Belgic] mile. In the N.W. of England and in Wales this mile lasted as 1·56 British miles till 1500, and the perch of those parts was correspondingly longer till this century. The " Old London mile " was 5000 feet, and probably this was the mile which was modified to 5280 feet and so became the British statute mile.'

PART III.

ON THE CUSTOMARY ACRES OF BRITAIN, IRELAND, AND ARMORICA.

CHAPTER I.

INTRODUCTORY.

IF the facts considered in the previous chapter may be relied on as good evidence that Gaul and Britain shared traditionally in the common possession of their customary mile or leuga of 1500 paces we are brought at once to the main problem of this inquiry.

It is the common possession of Britain, Armorica, and Ireland, of a group of similar customary acres on both sides of the Channel.

It is of course a matter of common knowledge that in various districts in Britain there have been prevalent *customary acres* remaining in local use in spite of all the efforts made to drive them out and to substitute for them the statute acre. It is also well known that the customary arpents or acres of the great corn-growing Armorican districts on the other side of the Channel have held their own with equal tenacity. But the fact that gives importance to the problem is that the group of customary acres of the Armorican corn district are *practically the same as those of Britain*.

The problem is not quite so simple as this.

I will therefore explain at once why I have used the expression ' *practically* the same.'

The form of the acres in nearly all cases is 1×10. But on both sides of the Channel a curious practice is observable of changing the form of the acre, without altering its area. The general form being 1×10, the acre is turned into two half-acres *each of the form of* 1×10. But the remarkable point is that this change of form occurs most generally, so to speak, *in the act of crossing the Channel.* Thus the Armorican arpents or acres, corresponding in area to British 1×10 customary acres, become on the other side of the Channel two half-acres, 1×10, combined into an arpent 1×5.

We are thus brought to consider as a preliminary question how and why in practice the change from the acre in the form of 1×10 to the two half-acres in the same form was effected. It is all the more needful to clear up this question at the outset inasmuch as it involves the curious further point that the change of form must inevitably dislocate the relation of the length of the furrow of the original acre to the itinerary measure. If the furrow of the full acre (1×10) be a given division, say, of the old British mile or leuga of 1500 paces, then the furrow of the *half-acre* in the same form must needs be a similar division *not of the leuga, but, mathematically, of half the diagonal of its square.*

All this seems at first sight to complicate the problem. But these facts are not confined to British and Armorican agricultural measures. Historically they bring us at once into contact with a wider world.

Let us go back to the fact that in our previous examination of Celtic areas of tribute we have been

resting exclusively on what we may call the *natural* system of measures—the thumb, the palm, the foot, the step of the ' middling-sized man.' We have followed no other standards of length beyond the suggestion that the 10 Roman feet of the Roman decempeda may be taken to equal 12 natural feet of minimum standard, the natural foot varying within limits between about 246 and 252 millimetres. The variation in the standard of the foot and pace does not and cannot alter the fact that the leuga of 1500 paces = 9000 natural feet and that of the Welsh milltyr = 27,000 natural feet. All these measures will share in the variations of the natural paces and feet.

There were, no doubt, in various parts of the world many artificial and derivative feet and cubits which may seem to complicate matters ; but whatever doubts and differences there may be between metrologists with regard to their origin I think it will not be disputed that the prominent Greek and Græco-Egyptian and Babylonian agricultural areal units were based upon this natural system of measures ; and that the limit of variation in the natural foot was very similar throughout, whilst ultimately the common recognition and use of particular itinerary measures, whether we take that of the Roman ' mille passuum ' of 8 stades or 1000 paces, or whether we take the Gallic leuga of 12 stades or 1500 paces, formed a prominent link of connection and stability of standard between East and West all along the route of their prevalence.

With regard to the similarity in the range of variation in the natural foot I wish I could transfer to these pages the beautiful example, given by Dr. Dörpfeld many years ago, involved in the ground plan of the two temples

of Sunium. ('Mittheil. des Deutsch. Arch. Inst.,' Athen, 1884.)

The older temple was probably destroyed by the Persians. In the time of Pericles it was replaced by another on precisely the same site and built on precisely the same plan.   There were the same number of columns, and these were the same number of natural feet apart from centre to centre.   If the standard of the foot used in both temples had been absolutely the same, every new column throughout the temple would have exactly covered the circular foundation of the old one.   But the standard varied slightly, and as the end of the rows of columns was approached, the new columns more and more overlapped the sites of the old ones. There were still 10 natural feet from centre to centre of the columns, and the variation in the standard of the natural foot carried out with perfect regularity was that between ·246 m. of the old temple and ·251 of the new one.

Thus by following all through our inquiry natural measures we seem to find ourselves so far upon a sub-stratum of common and solid ground extending far back into the past.

I do not think I run the risk of provoking any material difference of opinion on the part of leading metrologists if at this stage of the limited inquiry on which we are engaged I state the following facts :—

(1) The *khet* or Egyptian aroura was 100 Egyptian cubits square.   Transformed into two squares (of half the diagonal of the square) it became the *Greek medimnus*, *i.e.* the area suitable for the sowing of a *medimnus* of seed.

(2) The *Greek aroura* of 100 Greek cubits of 6 natural

palms turned into two squares (of half its diagonal) became the *Roman jugerum.*

(3) The *Greek plethron* of 100 four-palm feet (like those of the Irish tir-cumail) put into the form of two squares (of half its diagonal) became the *modius* or *socarion* for good corn-land, suitable for the sowing of a Greek *modius* of seed.

(4) There was also in use a square of 120 four-palm feet, and each of the two squares on half its diagonal became the *vorsus* of Italy ; and the double *vorsus* was in use as a *poor* or *wet-land* modius.

We shall have to recur to these Egyptian and Greek units, but in the meantime for the moment these *facts* of ancient agricultural custom will form precedent enough to prevent the reader from throwing up the Armorican problem in despair at the outset.

It may be added that these transformations of similar areas from one square to two involved precisely the same dislocation of the relations to the itinerary measure 2000 years ago as they do in the case of the British and Armorican customary acres. It may be added further that the use of the common itinerary measures and those based on the diagonals of their squares will be found to be a fact of remarkable historical interest.

CHAPTER II.

THE BRITISH CUSTOMARY ACRES.

I. THE CUSTOMARY ACRES.

THE object of this section will be to examine the British customary acres *separately from* the corresponding acres of the corn-growing district on the other side of the Channel, first, because it is important to understand their geographical position in Britain and also because they have their own relations amongst themselves and to the larger areas of tribute, Irish and British, already examined, quite apart from their correspondence with the Armorican acres.

We have seen already incidentally how intimately the erws and customary acres of Wales were connected with the units of tribute and food-rent, and at the same time how closely they corresponded with the actual methods of ploughing even in Wales, where pastoral interests were predominant and agriculture was in its primitive form of co-aration of the waste.

With the exception of the Dimetian and Gwentian erws, the form generally arrived at was ultimately that of 1×10. But in the two cases of North Wales, so graphically described in terms of practical ploughing, the *day-work* was in the form of 1×30—the 1×10 acre sliced into three. Or to put it the other way, and probably more correctly, the surviving customary acres

226

226

226

181
181·5

226

226

227

226

226
181
201

226

256

Ancient Scottish Mile 2222
Ordinary Scottish Mile 1810

256
256
256
237
256
256

256

256
256 256 256
256
256
256
275
256
292 256
292 256
256
329 256 256 256
292 275
275 292
292
292
292
256
219 220
329 292 220
4 256

(IRISH ACRE 256)

165
165

329
4
329
4
329 292 329
292 220 4
329 256
292 292
292
268
258
220

183
232 232

256 233 256 200
184

183

256
220

The figures are the length of the furrows in metres. Where no
figures are given the statute acre (furrow 201m.) may have
been the local acre or have completely ousted the customary acres.

FIG. 16.

of the district seem in some cases to have been formed by the combination of three of the more ancient day-work in ploughing put side by side.

These acres with a long furrow and a very short end present a great contrast to those in the form of a square, which occur seldom, if ever, in Britain, and which are most characteristic of the regions where the olive and the vine are the predominant objects of husbandry.

But Meitzen, in his great work, has reminded us that even square forms may have direct connection with methods of ploughing. The Roman jugerum was in two squares, with an ' actus ' or furrow of only 120 Roman or 144 natural feet. It was ploughed by a single yoke of oxen and connected with a system of *cross ploughing*, for which a square was obviously most adapted. The short furrow and single yoke were most adapted also to ploughing in a hilly country and custom everywhere tended to follow convenience and local needs. ('Siedelung und Agrarwesen,' 1895.)

The long furrow of the 1 × 30 and 1 × 10 acres was ploughed by a heavier plough and a larger team. In Wales and Scotland and manorial England the normal team˙ was of 8 oxen—and there was obviously no question of *cross ploughing*.

If we were to attempt to reason from this that the long furrow, whatever its origin, and wherever found, is everywhere a proof of a long settled preponderance of the agricultural over the pastoral element, we should be going too far. For it is precisely in the still pastoral period of Cymric tribal life in Wales that we find the long furrow in customary use with the typical plough-team of 8 oxen, which afterwards was in general manorial use throughout England.

It is important to notice that it was thus first connected, not with the settled agriculture of a village community, but with a tribal stage of husbandry in which the primitive system was in vogue, called ' co-aration of the waste,' consisting of ploughing up portions of the waste each year and letting them return into pasture after removal of the crop. In the light of the Welsh Codes the long furrow and the plough-team of 8 oxen, under Cymric tribal conditions, seem to be the result rather of the necessity of co-operation on the part of the tribesmen in what ploughing was necessary than in the exigencies of a settled agriculture.

It is precisely because the customary acres of Wales go back to the tribal period and to pastoral conditions that the problem involved in them is fraught with a special historical interest.

For Great Britain the evidence, as to the customary acres of different districts, though not so complete as might be wished, is sufficiently striking. The Report of the Agricultural Commission of 1820–1823, imperfect as it may be, records in English statute measures—yards and feet—the chief of the customary acres of each district, as they came under the Commissioners' notice. Other evidence, too, is to hand, which, without pretending to absolute geographical accuracy, locates these acres in districts sufficiently marked.

To give a general view of the geographical position of these acres, I have tried to put the evidence into the form of a map (fig. 16), on which I have marked roughly the geographical range of this or that acre by figures which represent in metres the *length of the furrow or long side of the acre*, the normal shape of the acre being in all cases like that of the statute acre 1×10.

The wide blanks on the map, where evidence of any local acre is absent, may probably very roughly be taken to mark the districts in which the statute acre either was the ancient customary local acre, or had supplanted others so completely that they had passed out of knowledge.[1]

II. THE ENGLISH STATUTE ACRE.

Let us take notice, to begin with, that the statute acre itself does not fit in very happily with measurement in statute yards and feet, whilst it takes an easy place amongst those based upon natural feet. Five and a half yards, or $16\frac{1}{2}$ feet to the rod, does not seem very happy.

On the other hand, the statute acre seems to find a reasonable explanation in the system of natural measures.

The Venedotian Code has shown us not only in figures but also in graphic description of actual ploughing that the short end of Dunwal's ' land ' ($\frac{1}{1000}$ of his milltyr) was 27 natural feet, and that its furrow, being thirty times its breadth, was therefore 810 natural feet in length. As already stated, three such erws put side by side would equal the *English statute acre* in its form of 1×10. Its end would be 81 natural feet, 9 rods of 9 natural feet, and well within the variations of the natural foot; 810 feet of ·248 would easily change into a round number of 800 feet of ·251 and correspond with its furrow of 201 m. We have seen that it was exactly so described in the Scottish fragments, viz. as 4×40 of a rod of 20 natural feet, thus making

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1 See *supra* for Map, p. 100.

its furrow 800 feet of King David's higher standard of
·251 m. for the foot of the middling-sized man, *i.e.* 201 m.

When examining the Scottish plough-land we noticed
that to make its 40 statute acres fit exactly into the two
squares of the lesser Brehon tir-cumail, of which the
plough-land was double in area, the 40 acres would have
to be turned into 80 half-acres.   Then 80 half-acres
(1 × 10) would exactly fill it.   So that the English
statute *half-acre* (1 × 10) was more directly connected
with the Brehon tir-cumail than the statute acre itself.
The furrow of this half-acre would be 142 m. in length on
the higher standard of King David's foot ·251—and
would equal just $\frac{1}{16}$ of the leuga of the same higher
standard.   Thus the half-acre, being the one the furrow
of which was a direct division of the ' *Old British mile,*'
i.e. the leuga, the furrow of the acre itself, 201 m.,
would be a similar division of *half the diagonal* of the
square leuga (viz. 1609 m.), which somehow or other
came to be the length of the English statute mile of
8 furrows of 201 m.

Passing from the statute acre let us examine those
customary acres the furrows of which are most obviously
direct divisions of the Old British mile or leuga.

III. THE CORNISH AND DORSET ACRES.

The *Cornish acre*, according to the Report of 1820,
has a furrow of from 219 to 220 m., *i.e.* the furrow is
$\frac{1}{10}$ of the leuga of lower standard, just as the prevalent
Scottish acre was $\frac{1}{10}$ of the leuga of the higher
standard.

The Cornish acre is described as 4 × 40 of a rod of
18 English feet, *i.e.* 5·5 m. or 8 × 80 of the local gad

or goad of 9 English feet or 2·75. Its area is 48 ares. The Cornish potato-grower still measures his ground by the ' lace ' of 4×4, *i.e.* 16 square Cornish *gads*.

The map will show that the Cornish acre appears sporadically in South Wales. It also seems to have left intermittent traces of itself in Leicestershire and East Anglia.

Its historical importance lies in the fact that converted into two half-acres 1×10 in form it becomes the prevalent Breton arpent, and forms the most obvious and important link between the British and Armorican evidence.

The *Dorset* acre has a furrow, according to the Report of 1820, of 184 m., *i.e.* very slightly less than the *stade* of 185 m. It is therefore $\frac{1}{12}$ of the leuga of lower standard. It is 4×40 of a *gad* of 15 English feet and *one inch*. The rod is therefore 4·6 m. and the area of the acre is 34 ares.

The *Devon* and *Somerset* acres with a furrow of 183 m., according to the Report of 1820, are so nearly identical with the Dorset acre as to be hardly distinguishable from it.

All these furrows are slightly shorter than what, as divisions of the leuga, they seem entitled to be, and probably the reason may be found in the description in the Report of 1820 of the Dorset acre.

The Dorset gad or rod, as already mentioned, is described in the Report as measuring 15 feet and *one inch,* with a praiseworthy attempt at perhaps *unusual* accuracy, whilst the odd inch may have been omitted in the possibly less accurate information received by the Commissioners in regard to the Devon and Somerset acres.

This extra inch in the Dorset gad reminds us that, as in the Report of 1820 and elsewhere nearly all the information is given in statute yards and feet without additional odd inches, *absolute* accuracy cannot be expected.

IV. THE FOREST ACRES.

In Central England, in the Forest District of the Peak in West Derbyshire, another customary acre takes

275 m   550 m   111 m

75·6

302·5

Dimetian | *tref*

6172 ares
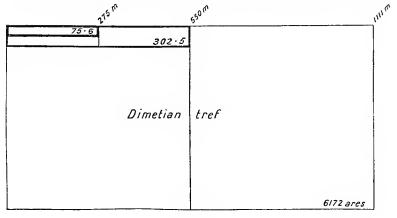
FIG. 17.

the form of 10×100 Cornish gads and has a furrow of 275 m. In Sherwood Forest the length of the furrow is doubled, the acre being 20×200 gads—making the furrow 550 m. The areas of these two forest acres are 75·6 and 302·5 ares respectively. The *half-acre* of the 275 acre occurs in the form of 1×10 in Northamptonshire, and was apparently, though the evidence is not complete, the one in use on the Battle Abbey estates in Sussex.

These two forest acres are respectively in form and area $\frac{1}{80}$ and $\frac{1}{20}$ of the Dimetian tref. And their furrows are respectively $\frac{1}{8}$ and $\frac{1}{4}$ of the leuga of 2200 m., *i.e.* the lower standard.

V. THE POWYS ACRE.
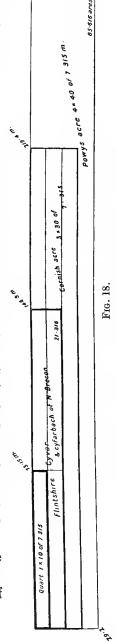
The next customary acre claiming attention has a furrow of 292 m.

The region over which it is prevalent begins in Lancashire south of the Ribble, includes Cheshire and Staffordshire, and stretches across the centre of Wales. From the position of the district covered by this acre it has been suggested that its home was the ancient Welsh district of *Powys*.

The area of this acre is 85·264 ares. Its connection with itinerary measures seems to be that (put into the form of a square) it would be $\frac{1}{4}$ of the square stade of 185 m., the area of which is 342 ares. In its 1×10 form it is divided into 4 'cyvars' or co-ploughings, and the 'cyvar' is again divided into 4 '*quarts*' in Flintshire.

Its furrow is $\frac{1}{3}$ longer than the Cornish furrow.

It is 4×40 of a rod of

Fig. 18.

This *Powys acre* is in area $\frac{1}{4}$ of the square stade of 185 m., *i.e.* 85·69 ares.

7·315 m., and 3 × 30 of this rod would make the Cornish acre.

This will be seen at once in the diagram.

The Powys acre and the Cornish acre evidently belong to the same system.

VI. THE NORTH WALES CUSTOMARY ACRE.

Next we return to the important and instructive customary acre already mentioned as consisting of three of Howell's ' legal erws ' (1 × 30), three of which, when put side by side, made an acre of 1 × 10. As described in the Report, in English yards it had a furrow of 329 m. and an area of 108·241 ares.

Howell's ' legal erw ' (36·08 ares) is still known in North Wales as ' the true erw.' It consists of 3 stangels, each in the form of 1 × 10. So that the 329 m. acre itself consists of 9 of these stangels, and the Cornish acre in form and area would contain just four of them.

The acre of 329 m. is also divided in North Wales into 4 ' stangs,' measured 4 × 40 of a *paladyr* of 4·117 m., the paladyr being 1½ of the Cornish *gad*. This ' stang ' or quarter of the acre is known in Montgomeryshire as the ' *stang a dyr,*' and in North Wales as the ' *cyvar* ' of Anglesea and Carnarvonshire. It is found again as the customary acre of Herefordshire. It has an area of 27·08 ares, *i.e.* nearly exactly that of the Greek medimnus.

According to the Report of 1820 two of the 329 m. acres, *i.e.* eight of these stangs or cyvars, in Glamorganshire and Pembrokeshire make an ox-land and 8 ox-lands a plough-land. The area of the plough-land would be 1744 ares and that of the ox-land 218 ares.

Thus the plough-land contained in area 36 Cornish acres. It was in area half Dunwal's tref and $\frac{1}{8}$ of his maenol, and $\frac{1}{256}$ of his square milltyr.

The Cornish connection of this acre of 329 m. furrow is shown further by the fact that it can be measured 12×120 of the Cornish gad of 2·75 m. as well as 8×80 of the local *paladyr* of 4·11 m. which, as already said, was $1\frac{1}{2}$ of the Cornish gad. Its quarter (the *cyvar of Anglesea*, and the *Herefordshire acre*) is 4×40 of the *paladyr*, while the stangel of $\frac{1}{9}$ its area is 4×40 of the gad.

Recurring to the point above alluded to, that, owing to the absence of odd inches in the 1820 Report, *absolute* accuracy cannot be expected, it is fortunate that so often the survival of the local gads or rods by which the local customary acres were measured is reported. It shows that these acres were not originally based on English statute feet and yards, but upon their own local rods.

VII. THE SCOTTISH AND NORTHUMBRIAN AND CUMBRIAN ACRES.

It will be seen on the map over how large a geographical area these acres were in use (p. 100).

The most prevalent Scottish acre—*i.e. the* Scottish acre, is described in the Report as having a furrow of 227 m., *i.e.* $\frac{1}{10}$ of the leuga of higher standard, and it may be mentioned here that the old Edinburgh mile is reported in the books to have been 2222 m. in length. This, of course, is a traditional recollection of the old British mile or leuga, which would thus seem to have

been at home in Scotland as in Britain and Gaul.   On
King David's standard of ·251 m. for the natural foot
this mile of 1500 paces would equal 2259 m. with which
the customary furrow of 227 would nearly correspond.
Moreover, this Scottish acre finds a slightly exaggerated
counterpart on both shores of the Solway Firth and
in the ancient Dalriada.   It is there known as the
Cunningham acre and is still in use in East Ulster.
It has a furrow of 228 m. and from the fact that
Dalriada extended into Scotland the historical connec-
tion is obvious, whatever may be its relation to the
Scottish acre of slightly lower standard.

It should be noticed also that but for the difference
in standard this Scottish acre would be identical with
the Cornish acre.   A similar customary acre is reported
as in use in Lincolnshire.   And the similarity in area
on the higher standard of this Scottish acre with that
of the Roman sors of two jugera is a fact which may
have a meaning, though any immediate identification
might be misleading.

There remains to be considered the important
customary acre which whilst conspicuous in Britain
as occupying mainly the Northumbrian and Cumbrian
geographical position of the Celtic Brigantes, has, from
its prevalence in Ireland, become best known as the
' Irish or Plantation acre.'   There is a mystery about
it which is not easily dispelled.   (See below, p. 147.)

Its area is 65·62 ares and its furrow is 256 metres.
As we have seen, its *half-acre* in the form of 1×10,
according to the early Scottish fragments, had a furrow of
181 m. and was important enough to give rise, according
to the books, to a local or customary Scottish mile of
ten times its length, viz. 1810 m.

It is difficult to connect the furrow of 256 m. with itinerary or natural measures ; and unless the furrow of 181 m. could be considered as a diminished stade of 185 m. it is difficult to connect it with any itinerary measure other than that to which it seems to have given rise. But if the furrow of the half-acre might be raised
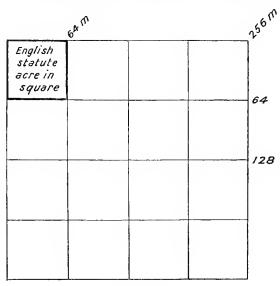
FIG. 19.
Square of the 256 m. furrow.

to 185 m., so the furrow of the acre itself would have to be raised from 256 to 261 m. And it is significant that these figures would bring us to the further point that they would represent almost exactly $\frac{1}{10}$th of the figures of the greater tir-cumail regarded from the point of view of its dimensions on the highest and lowest standard of the natural foot. So difficult does it seem to be to get outside the meshes of the network of Celtic measures.

I

Recurring, however, to the fact of its prevalence side by side in the north and in Wales with the English statute acre, it may further be noted on the other side that the square of its actual furrow 256 m. would contain 16 English statute acres put into the form of a square, as shown on p. 111.

And, to go one step further, there might possibly be significance in the fact that whilst the English acre in a square would contain both in area and shape 8 *Dimetian erws*, the Irish acre itself put into a square would contain both in area and shape 9 *Gwentian* erws. So that the South Wales erws may after all be divisions of the English and Irish acres respectively in the form of a square.

The wide prevalence of this mysterious acre is also remarkable. Though its chief geographical home seems to be that of Yorkshire and Cumberland and Lancashire north of the Ribble, it is sporadically present also in Northamptonshire, South Wales, and Cornwall.

VIII. THE HALF-ACRES IN FORM OF 1 × 10.

Allusion has been made already to a class of acres which are *half-acres* of other customary acres put into the form of 1 × 10.

The *half-acre* of the Northumbrian 256 m. acre in use in Scotland, with a furrow of 181 has just been considered. The *half-acre* of the 329 m. acre also occurs in the form of 1 × 10. If we might raise this furrow from the lower to the higher standard, viz. 329 to 335, the *Westmorland acre*, with a furrow of 237, becomes its half-acre, whilst in the lower standard of 233 it occurs in the southern counties of England sporadically.

Another of these half-acres also turns up in North-amptonshire. From a note on a fly-leaf of one of the MSS. of the Record of Carnarvon it appears that contiguous districts in Northamptonshire had various customary acres, which were declared to be of larger size than that of the Priory of Fineshade. It was said that these larger acres of other districts ought to be ' set every acre for more money than Fotheringhay or the Priory of Fineshade,' whose acre was stated to be 4×40 of a rod of 16 feet,[1] *i.e.* with a furrow of 195 m. This Fineshade acre was in fact a *half-acre* of the neighbouring West Derbyshire forest acre whose furrow was 275 m. (See above p. 106.)

This note is valuable as revealing that in con-tiguous districts of Northamptonshire there were three separate customary acres, viz. the Northumbrian acre of 256 m., the Cornish acre of 219 m., and the forest half-acre of 195 m.[2]

This accidental evidence also suggests that wherever

1 See also that of Harleston Estate Book of Henry de Bray. (*Trans. of Roy. Hist. Soc.*, 1910, p. 123.) ' According to the measure of the perch on the gable outside the Chancel at Harlestone.'

2 *Harleian MS.* 696 ; see *The Record of Caernarvon*, 1838, p. xxii :—

Me^d. y^t in the lordeship of Ape-thorp y^t is nowe Williame Gruffith to hym & to his heires/and in al the townes y^t weren or bene of the Kyngs holde w^t in y^t side of Northamptoñ shire the polle con-tenes xxj fote by the stondart [*the furlong therefore would be* 256 *m.*] as John Rowland told to the saide to the same Willm̃, and oỹ men of the saide Towne saiden y^t the Polle contened xx. fote by the stondart tñ quẽr. Also in the lordeship of ffodryn-gay xviii fote gose to the Polle [*furlong* 219 *m.*]. And in the Prio^r of ffynsehede is holde xvi fote gose to the Polle [*furlong* 195 *m.*]. Itm̃ one Polle of brede and xl. Polles in lengthe makes a Rode of londe. And iiij. Rode gose to the Acre/and so Apethorp londe agñte to be set eu'y Acre for more money then ffodryngay or Prio^r of ffynsehede londe ffor the acres bene more &c.

adjoining districts with separate customs met there might well be a conflict of rival customary acres and half-acres of which the memory has locally gone to sleep, under cover of the prevalence of the statute acre.

Finally, to wind up this statement of the customary acres of Britain, we seem to be driven by the evidence to regard them, whether of the lower or higher standard, as originally based upon natural measures—actual feet and steps of consequently slightly varying length—but in nearly all cases, either in the length of their furrow or their area, aiming at a definite relation to one or other of the prevalent itinerary measures—the milltyr or its divisions, the leuga or the stade—the actual length of these being regarded as varying within similar limits.

In days of rough natural methods of mensuration there was no standard system of metres and millimetres by which every measure could be defined and fixed. The Roman *decempeda*, no doubt, during the period of Roman rule must have provided a fixed standard, and when it came into contact with natural measures it may, as suggested, have fixed the minimum of the natural foot at ·246 m. as $\frac{1}{12}$ of its length.   But how and where was the standard Roman decempeda to be found in practice by which the *goads* and *yokes* could be tested ? No doubt there may have been kept in various places, in churches and elsewhere, rods and goads which in each neighbourhood may have been regarded as local standards.   The *bat* or *eglyshaw* may have been one of these, and long yokes would be made of a generally recognised length in each locality, but it would be absurd to expect absolute identity of standard in actual practice.

Still looking at the customary acres of the Southern

' West Wales ' group, it is remarkable how consistently the tendency is shown to sink rather below than above even the minimum standard. This applies to all the acres which were measured by the Cornish goad. In a remarkable way they seem to hang together in this as in other respects.

On the other hand, the furrows of the statute acre and the Northumbrian or Irish seem to be built on the higher standard. And this is a fact which amongst others it will be well to bear in mind as one from which historical inferences may hereafter possibly be drawn.

IX. THE CONNECTION OF BRITISH CUSTOMARY ACRES WITH IRISH MEASURES.

There remain, before we pass from the British customary acres to those of Armorica, across the Channel, two points which must not be disregarded :

(1) How far were these British customary acres prevalent in Ireland ?

(2) What relation had they, if any, to the two greater units, the *tir-cumails* ?

The evidence on the first point is clear. A document in the Carew MSS. of the time of James I. describes accurately in detail what were the customary acres that the English surveyors had to deal with in Munster.

They turn out to be three acres with which we are already familiar in Britain, those with the furrows of 256 m., 292 m., and 329 m., with an additional one of 354 m., which, in area and shape, is 5 Roman jugera put end to end. To these may be added the *Cunning-ham* acre in Ulster, already alluded to, with furrow of

228 m., which seems to belong to the ancient *Dalriada*
on both sides of the Solway Firth.

The question of course arises whether these British
customary acres, being found present in Ireland in the
sixteenth century, are to be regarded as importations by
English immigrants or as indigenous in Ireland, and so
survivals of conditions common to both sides of the
Irish Sea.

The relation of these customary acres to the great
tir-cumail is very remarkable.

The great tir-cumail of *lower* standard, *i.e.* reckoned
on the natural foot of ·246 m., contains 130,356 ares.

It would therefore contain

        1200 of 108·63, *i.e.* of the 329 m. acre of 108·241 ares.
        1500 of 86·90, *i.e.* of the 292 m. acre of 85·264 ares.
        2000 of 65·178, *i.e.* of the 256 m. acre of 65·62 ares.
        2500 of 52·14, *i.e.* of the 228 m. acre of 52·28 ares.
        3240 of 40·23, *i.e.* of the 201 m. acre of 40·46 ares.
        4800 of 27·16, *i.e.* of the 165 m. acre of 27·06 ares.

The fact seems to be that, with the one exception
of the 292 acre, unless the measurements of all these
acres have been underestimated in the Report of 1820
by description in even statute feet and yards, they
correspond remarkably as divisions of the greater tir-
cumail of lower standard.

CHAPTER III.

In transferring our inquiry from the British to the Armorican agricultural region, it will be needful before confining attention in particular to the customary acres or other land units, to refer very briefly to the agricultural conditions under which they were prevalent. This becomes all the more necessary seeing that our first attention is turned to the extreme Western extremity of Europe, the Land's End of the Armorican peninsula.

It is not enough to say that its agricultural unit, or arpent, is practically the same in area as that of Cornwall—the extremity of West Wales.

To understand the full meaning of this resemblance we must have regard to environment and the peculiar form of the still prevalent open field agriculture of which the Breton arpent forms the agricultural unit.

I cannot pretend to be able to do justice to this part of the subject, which would be worthy of more detailed study, but I venture to hope that the facts gained from a very limited examination on the spot many years ago may be of some use in the absence of more complete evidence.

During a visit to Brittany in 1887, leaving the rail at Quimper, I made a point of visiting the wildest district

within reach, viz. the peninsula of Penmarch on the south-west coast of the Département of Finistère.

The commune of Penmarch lies in the corner of a blunt promontory swept as bare of trees as the Cornish Land's End by Atlantic gales. Its wide stretching monotonous plains are still cultivated on the open field system. They are dotted over with scattered *kers* or hamlets, each surrounded by its open fields. The hamlet of *Saint Gwénolé* is conspicuous owing to its massive tower or belfry—the only portion remaining of the ancient church, forming a central landmark visible from far away.

Taking an intelligent Breton as guide and walking over the open fields, the most obvious fact at once noticed was that the arable plain was generally ploughed up into long narrow ' high-backed lands.' One noticed also in some cases the double curve in the strips, the reverse of the letter S, so common a result of open field ploughing. These high-backed lands are very narrow and piled up in the ploughing almost like the mound of a grave. They were hardly broader than a long step. They are known in Breton by the same word *erw* as in Cornwall and Wales, and also as ' sillons.' And several of them in combination form the *journal* or *arpent*.

The peasant holdings consist of so many erws or combinations of them scattered over the open fields. But the equality of the holding, if ever prevalent, has long ago been lost.

As the Roman actus, meaning the single drive of the plough or length of the furrow, became the limit of the acre, and gave its name to the square of which the jugerum was the double, so the ' arpent '—the ancient

Gallic ' aripennis '—has been identified by Professor Ridgeway and others with the Brehon ' *aircean,*' a word used in Irish for the end of the side of the larger agricultural unit, the ' tir-cumail.' So the Breton words ' ero,' and ' irvi,' and ' ervenn,' and ' arpent,' seem to have their first meaning in the drive of the plough to the end of the furrow, marking the length of the strip and thus falling naturally, both in the thing itself and the name, within the lines of common agricultural tradition.

In the open fields of Penmarch as elsewhere the strips lie in groups, and each group has its headland on which the plough is turned at the end of the furrow. The word for the headland is *talar* or *dalar*, plural *dalarou*—like the Welsh *talar* and *talarau* for the same thing. There is in Breton a touching use of the word, showing how completely the practice of the traditional open field husbandry is embedded in the mind and life of the Breton peasants. The right of turning the plough-teams on the headlands makes them always the last strips to be ploughed. So this last work of the jaded ploughman and worn-out oxen at the end of the season becomes the familiar symbol of the last struggle at the end of a life of toil. The Breton peasant nearing his end, with laboured breath, is said to be ' ploughing his headlands.'

This phrase may at first sight suggest the solitary ploughing of a single peasant. But in the absence of more direct evidence of Breton co-ploughing we may perhaps connect the Welsh *cyvar* and the Irish *comar*, both used in the sense of co-ploughing, with the Breton *kefer* or *kever* applied to the Armorican *journal* or *arpent*. Still further when the customary *journal* in

the Vannes dialect is called a *kever-doar*,[1] it is difficult
not to connect the word with the Welsh *cyvardir*, in the
sense of a co-ploughed land. Treading one step more
on treacherous ground it may not be unreasonable to
claim that the Breton application of the term ' day's
ploughing ' (*devez-arat* or *deouech-arat*) to the *kefer* or
journal may suggest at least that the ' day's ploughing '
of it involved *co-aration*.

Another essential feature of the open field system
is the common right of pasture over the fields when
the crop is removed.

The whole of the open field is called by the peasants
the ' mégou ' (pronounced mejou)—' the fields.' The
word is also applied to uncultivated or waste land, and
is used to describe the part of the fields for the time
being without crop, emphasising the fact that during
part of the year the ploughed portion falls back into
waste and becomes common pasture again.

Thus, however imperfect the information gathered
by a visitor, with a Breton dictionary in his hand and
an intelligent guide at his elbow, during a walk over
the open fields of Penmarch may have been, the general
impression gained can hardly be far wrong that this
Breton open field system, both in its facts and its terms,
has very close relations to that of Wales and Ireland,
and shares with them to a remarkable degree agricul-
tural traditions which seem to belong to an ancient
common inheritance.

So much for Penmarch. As we walked along the
shore to the ' *Pointe de la Torche* ' the peasants were
busy collecting the seaweed thrown up by the great
Atlantic waves, and burning it for manure, exactly as

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[1] Douar=tir or dir, *land.*

the Irish peasants do, in roughly made furnaces on the spot built up of stones from the beach. As we stood on the rocky ' pointe ' the little columns of smoke from these furnaces rose at intervals all along the coast, just as we had seen them in the North of Ireland at the mouth of Lough Swilly.
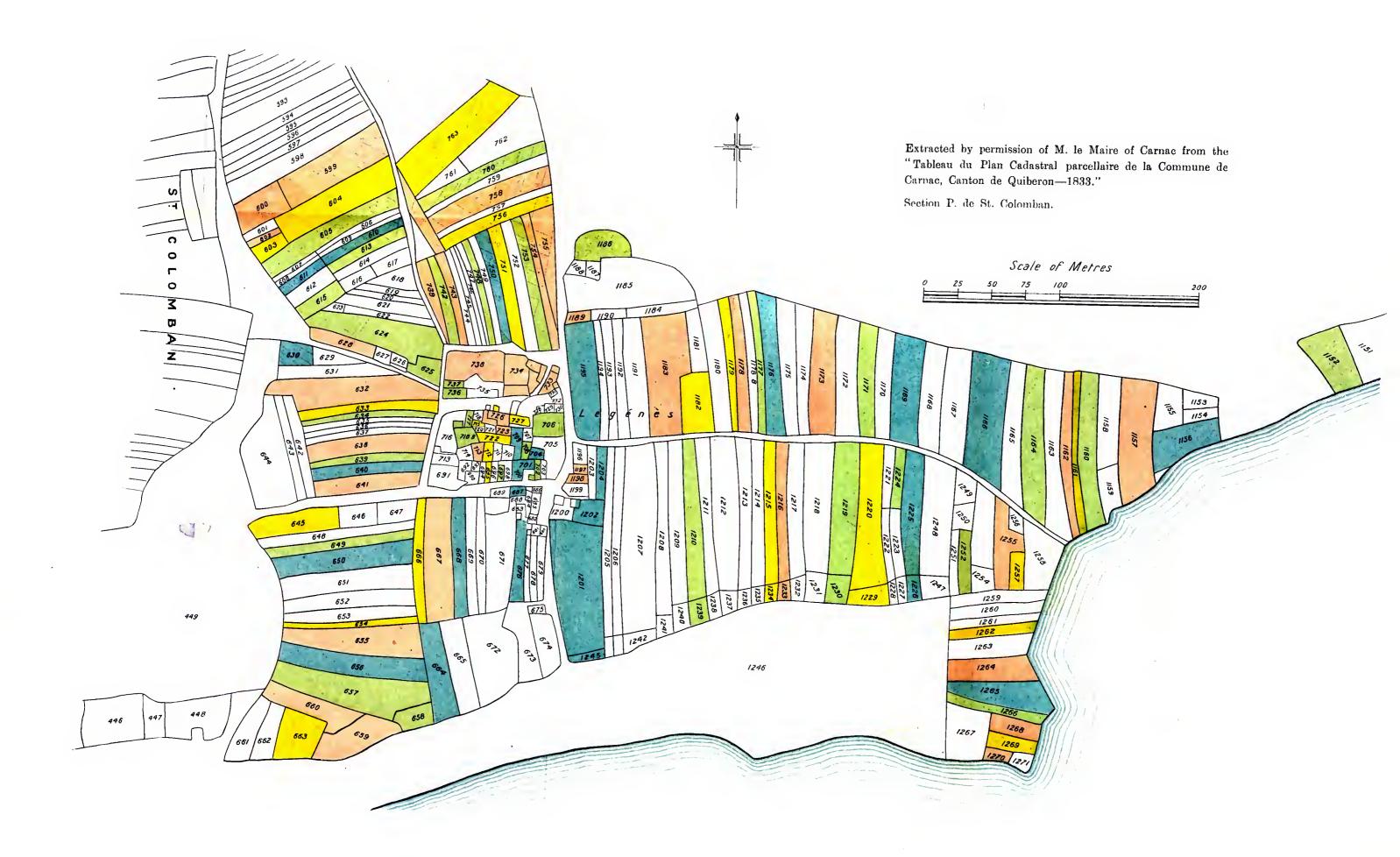
Further inquiry resulted in the fact that the primitive open field system extends to Cape Finistère and the islands off the coast. At *Plouharnel* and *Carnac* and at the préfecture at Nantes the field maps of all the country round are available. Illustrated by the published ' usages locaux ' of each commune they afford abundant evidence of the most authentic kind of the division of the fields everywhere into the strips or erws, of the two or three-field system of rotation of crops, of the scattered nature of the holdings and of the *vaine pâture* or right of pasture over the strips after removal of the crops.

As in the case of Saint Gwénolé a prominent feature of the district of Carnac is that instead of each *commune* being a single village community with its open fields around it, it is in fact a collection of hamlets or *kers* dotted over the district. Each *ker* is a closely packed group of a few homesteads and farm buildings, the absence of windows outside giving the *ker* the look of a fort. Within its precincts each *ker* has generally its common well and common oven (often of solid masonry) and its own set of open fields spread out around its walls.

Viewed from the modest knoll of Saint Michel the plain stretches far away on all sides and is dotted over with these little *kers*. Carnac marked by the lofty spire of the church of St. Cornély has grown into the centre

of a *commune* composed of several of these *kers* for the festival day of the saint, who is supposed to be a special patron of cattle ; the devout peasantry flock in crowds from the various *kers* bringing their heifers to be blessed at the sacred well and purchasing halters which have received magic virtues from the blessing of the saint.   One is forced to realise how all these customs and traditions hang together and how the Roman Church, absorbing them into its system, has become the centre of the daily life of the peasant, as in early ages the Druidical priests may have been.

Surrounded by the remains of a primitive civilisation, one begins to understand how the Romans found it to be their best policy to absorb silently into their provincial system of rural administration much that was of Gallic origin, as they did in the case of the Gallic leuga.   Here in this region of ancient Celtic and pre-Celtic monuments Roman remains show clearly how the Roman soldier had no superstitious fear or reverence for the weird procession of stones, one branch of which in its strange monotony ten or twelve stones abreast, stretches across the plain of Carnac for hundreds of yards and then abruptly halts at *Kermario,* no one knows why, just when its stones are hugest and its front most imposing.   Roman soldiers did not scruple to build against these stones or even to draw some of them into the line of their ramparts.   But the Breton peasant regards them still with awe, as an invading army turned into stone by his patron Saint Cornély, and old maps show that the open field husbandry brought itself up to a sudden stop with a final headland in front of the procession of stones, daring to proceed no further.

St COLOMBAN

Legénes

Extracted by permission of M. le Maire of Carnac from the "Tableau du Plan Cadastral parcellaire de la Commune de Carnac, Canton de Quiberon—1833."

Section P. de St. Colomban.

Scale of Metres

0 25 50 75 100   200

I am able to give the tracing of a map of one of the *kers* in the commune of Carnac, by way of evidence that the open field system in the peculiar form described is at home in the extremity of Brittany.

In visiting the district round Redon the prevalence of the open field system may be at first sight not so apparent. The chestnut tree to the eye seems to become the ruling object of husbandry. Seemingly, square fields are often enclosed with hedges composed of chestnut trees. But an inspection of the official map of the commune at once discloses the fact that the area within these square enclosures is in reality divided into strips with the same scattered ownership belonging to the open field husbandry.

CHAPTER IV.

THE ACRES OF THE CORN-GROWING DISTRICTS OF FRANCE.

I. THE BRETON ARPENT.

THE correspondence in area of the Cornish acre and the Breton arpent taken together with the change of form from 1×10 to 1×5 is a typical instance of what will become familiar as we proceed.

The Cornish acre, as we have seen, is in the form of 1×10, *i.e.* 4×40 of a rod of 5·5 m. or 8×80 of the gad or goad of 2·75 m. The Cornish peasant, as we have noticed, still measures his potato plot as 8×8 of this gad, and calls the square (which is $\frac{1}{10}$ of the acre) a '*lace*,' '*laz*' being Breton for a rod. But the Cornish peasant measures the customary acre 4×40 of the rod of two gads, *i.e.* of 5·5 m.

The Breton peasant measures his arpent (1×5 in shape) with 4×20 of a *corde* of 7·8 m. What is this Breton *corde* of 7·8 m. ? It is in length exactly the *diagonal of the square of the Cornish rod of* 5·5 m. ($5·5 \times 1·415 = 7·8$).

That this customary arpent is not of modern introduction is shown by article 263 of the 'Consuet. Brit.'

quoted by Du Cange,[1] in which is the statement *'Arpennis, seu Jornale apud Armoricos constat* 20 *chordis in longitudinem et* 4 *in latitudinem extensis, chorda vero* 24 *pedibus regiis.'* The Royal standard foot of France is ·325 m. and 24 of these feet = 7·8 m.

There has been no change in the corde since the date of the Custumal. The furrow of 20 cordes was then, as now, 156 m. in length, and the arpent then, as now, in the form of 1 × 5, measured 31·2 × 156 m. Now, the Breton corde of 7·8 being the diagonal of the square of the Cornish rod 5·5 m., the small end of the Breton arpent is the diagonal of the square of the small end of the Cornish acre, while the long side or furrow of the Breton arpent is half the diagonal of the square of the Cornish furrow. So completely is the Breton arpent both in area and construction a transformation of the Cornish acre 1 × 10 into the two half-acres, *each* 1 × 10, which combine to make the Breton arpent of 1 × 5 m., or it may be the reverse.

The area of the Cornish acre is 48·4 ares, and that of the Breton arpent 48·624 m. The small discrepancy is sufficiently explained by the measurements being given in even feet of English and French standard.

The connection of the furrows of these acres with itinerary measures is also remarkable. The Cornish furrow being $\frac{1}{30}$ of the milltyr the Breton furrow ought mathematically to be $\frac{1}{30}$ of *half the diagonal* of the square of the milltyr, *i.e.* of 4680 m. How does the Breton peasant bring the length of his furrow into harmony with itinerary measures ? At the time of my visit in

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1 Sub *Arpennis.*

1887, I made inquiries on the spot, and having purchased the official ' Usages locaux ' of the Breton department of ' *Ille et Vilaine* ' I found to my surprise that the local ' lieue de Bretagne ' was 4677 metres, *i.e.* half the diagonal of the square *milltyr* of the Welsh Codes, as, mathematically, it ought to be.

Nothing could show more clearly the close connection between Breton and Cornish itinerary and agricultural measures than this transformation of the Breton itinerary measure not into half the diagonal of the square *leuga* but into half the diagonal of the square *milltyr*, which in the Venedotian Code of North Wales was attributed to the mythical Dunwal.

It may perhaps be said that the milltyr may have been imported with the acre from Cornwall to Brittany by the emigrants who fled from the Saxon Conquest. On this hypothesis it would be very striking evidence of the early prevalence of the ' milltyr ' in Cornwall, as well as in Wales. We should have to begin to believe in the personality of Dunwal as well as in the prevalence of the measures ascribed to him. The tradition of the Venedotian Code making him the successor of the King of Cornwall by marriage with his daughter would thus find some foundation!

But there is the other possibility, viz. that whilst in most cases the agricultural unit was derived from the itinerary measure, in some cases the agricultural unit may have been the one rooted most deeply in local custom, and a local itinerary measure may have been derived from it.

But this ' lieue de Bretagne ' can hardly have been derived from Britain, for it occurs also as the local ' lieue ' of the Province of Berry and again in the

Lyonnais, as though it had its home in the South of France.[1]

The Breton arpent forms so typical an example of the change in the local itinerary measure to make it correspond with the change of form without change of area in the arpent, that it may be well to follow the lead it gives us a little further.

The fact has already been mentioned that the Egyptian *khet* or aroura, continued in use under the Ptolemies, was in *one* square, but that when turned into *two* squares it became the Greek *medimnus* of Cyrenian usage. The sides of the medimnus were directly connected with the stade and the leuga of our Western districts. But with what itinerary measure was the khet in a square connected ?

This question brings us back to the Breton arpent, for if, changing the point of view from the close connection with the Cornish acre, we take the other direction and ask what is the connection of the Breton arpent with the wider Continental and ancient world, we find that

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1 *Atlas Géographique et Militaire de la France.* R. J. Julien à l'Hôtel de Soubise, 1751.

Echelles de l'Etendue du Degré de Latitude évaluée à 57,060 Toises du chatelet de Paris.

Lieuës communes de France et de Normandie 25 (to degree) . . . . *i.e.* 4444 m.		
Petites Lieuës de France, ou Lieuës de Paris et de Sologne . . . . $28\frac{1}{4}$,, 3932 ,,		
Grandes Lieuës de France ou Lieuës Marines . 20 ,, 5554 ,,		
Lieuës de Beauce et de Gastinois . . . $33\frac{3}{4}$,, 3291 ,,		
,, de Gascogne et de Provence . . . 19 ,, 5846 ,,		
,, de Bretagne et d'Anjou . . . $25\frac{1}{2}$,, 4539 ,,		
,, de Berry . . . . . . $25\frac{3}{4}$,, 4702 ,,		
,, de Bourbonnois . . . . . 23 ,, 4829 ,,		
,, de Lyonnois . . . . . $23\frac{1}{4}$,, 4776 ,,		
,, de Picardie et d'Artois . . . . $25\frac{1}{4}$,, 4400 ,,		
Milles d'Angleterre . . . . . 70 ,, 1572 ,,		

its furrow of 156 m. is only one metre less than three times the length of the side of the Egyptian khet in its original square form. The square of the Breton furrow would therefore contain 9 Egyptian khets. Was then the side of the khet also a division, not of the leuga, but of the diagonal of its square ? And if so in what geographical region were the diagonal itinerary measures in use with which it was connected ? Is there any evidence of their prevalence anywhere in the Eastern world ? This is not an altogether wild or useless inquiry.

We know from Herodotus and others that next in importance to Egypt as a corn-growing country was the plain at the mouths of the Danube and other rivers which flow into the north-western corner of the Euxine. The reader will hardly need to be reminded that Athens drew most of her corn supply from this region, and it was studded with Greek cities, whose commerce was of great historical importance. Moreover, this district, hardly less than Egypt under the Ptolemies, was under Greek, and, specially, Macedonian influence. The corn from this rich corn-growing centre was measured in Greek *medimni*. It is natural therefore that we should seek for the itinerary measures connected with the khet and medimnus in the district from whence the corn supply of Athens and other Greek cities was derived.

It is true that direct *contemporary* evidence as to the local itinerary measure of the Danubian district fails us, but we have seen enough to warrant a reasonable trust in the antiquity and permanence of customary measures. Turning, then, to Martini [1] for information

1 Angelo Martini, *Manuale di Metrologia*, Torino, 1883.

as to the customary itinerary measures of this region what do we find ?

The ancient measures of ' Bucharest ' and of ' Jassy ' are thus described :—

(1) *The Posta* = 2 mil = 15,697 metres.

(2) The *Mil* = 7848 metres.

(3) The *Lega* di Rumania = 3924 metres.

(4) The Lega di Moldavia (Jassy) is described as practically of similar length—3962 m.

Thus the *Posta* of Rumania is a round 100 furrows of the Breton arpent, *i.e.* 5 diagonals of the square leuga. The *mil* of Rumania is 50 furrows of the Breton arpent, *i.e.* 5 half-diagonals of the square leuga, whilst the Rumanian and Moldavian *Lega* is 25 furrows of the Breton arpent, or $2\frac{1}{2}$ half-diagonals of the leuga.[1] Not that these Danubian itinerary measures so obviously *Breton* at first sight had anything directly to do with the Breton arpent.

We may come to the conclusion that a more probable explanation may be found in the wide prevalence of a common tradition extending from the Euxine into Western Europe. Be this as it may for the moment, the fact remains—whatever the explanation of it may be—that while the long side of the *two squares* of the medimnus (viz. 74 m.) is $\frac{1}{30}$ of the leuga, the side of the khet or medimnus in one square (viz. 52·4 m.) is $\frac{1}{30}$ of the *half-diagonal* of the leuga. The customary itinerary measures of the great corn region of the northern plains of the Black Sea are found after an interval of 2000 years, mathematically speaking, to be multiples of the side of the Egyptian khet, and therefore of the Breton arpent, and not of the Greek medimnus in two squares.

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[1] Cf. the ' *Lieue de Paris et de Sologne,*' 3932 m.

So that the seeming coincidence hid in the fact that the Rumanian Posta is exactly 100 furrows of the Breton arpent may be simply the historical result of common relations of the Breton arpent and the khet to the *diagonal of the square leuga.* In any case the fact itself is important in the illustration it gives of the persistence of the relation between agricultural and itinerary measures.

But to return to the Breton arpent. If we would bring it into touch with what we have seen of Breton methods of ploughing we must examine its structure more minutely. As already remarked, walking over the erws they are found to be ploughed into very narrow high-backed strips sometimes scarcely more than a long stride in width. How does this comport with the Breton arpent? The narrow strips evidently were not *arpents.* They were called *erws,* or sillons, by the peasants, but evidently several of them went to the making of the *arpent.*

In the Official Tables[1] for the extreme Western departments of the *Côtes du Nord* and *Finistère* the arpent of two half-acres with a furrow of 156 m. is described as consisting of 120 *raies* or single furrows about $\frac{1}{4}$ of a metre in width—6 of these raies being grouped in a sillon 1·56 m. in width. The *sillon* therefore probably corresponded to the narrow high-backed land, 20 such sillons in this district making the arpent. The sillon, or high-backed land, was the same width in the Department of Ille-et-Vilaine.

But in Morbihan, round about Carnac, the arpent is said to be divided into 60 sillons, which would make the width of the sillon only ·52, little more than half a metre.

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[1] See reference below on p. 137 note.

F<small>IG</small>. 20.

In the ' *Recueil des Usages Ruraux* ' in the Canton de *Seiches*, near Angers, the ancient practice of cultivation in high-backed sillons of ' *one or one and a half* ' metres wide is spoken of with strong disapprobation as still general in the canton. How far further eastward it extended I am not able to state.

But in the introduction to the Redon Cartulary it is stated on the authority of local archives that at Rennes in the fifteenth century there was a *journal* of 16 sillons each of 6 rayes. These variations in the structure of the prevalent arpent and the further fact reported that there were in one or two districts variations of the arpent itself, *but without alteration of the length of the furrow*, are also interesting. Thus there is mentioned an *ancient journal* of *Vannes and Rennes* and ' *petit journal* ' *of Morbihan* with an area of 36·468 ares and its double with an area of 72·936 ares, still having the same furrow as the arpent—the fact being that the latter is simply three of the *half-acres* instead of two.

This method of retaining the furrow of 156 m., and of increasing or diminishing the area of the arpent in certain cases by altering the number of sillons, brings into notice the further fact that in some districts there was also a customary arpent *in a square*. It was a division of the square of the furrow of 156 m. into 4 apparently square arpents with 78 m. to the side and with an area of 60·78 ares. This square arpent was probably in use for other crops than corn, for it occurs sporadically much further afield than the 1×10 or 1×5 arpents distinctive of Brittany and the corn-growing district of Northern France. The accompanying map (fig. 20) will show the extent of the prevalence both of the normal arpent of Brittany fading away towards the East, and also of this apparently square arpent

passing southwards into the region of the vine, where
the 1 × 10 acre disappears.
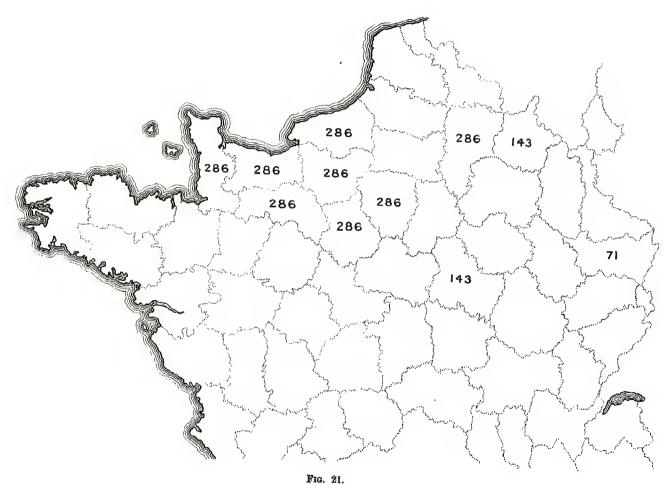
These facts, standing alone, might or might not
afford sufficient ground for historical inference as to
origin. But they bear within themselves at any rate
some significance. We may probably state the inference
thus :—

That the square of the Breton furrow of 156 m.
contains without alteration in shape 9 of the Egyptian
khet ; and that both the Breton furrow and the side
of the khet find their direct connection with itinerary
measures, not with the leuga, but with its diagonal,
whilst the furrow of the Cornish acre (similar in area to
the Breton arpent) is a direct division, viz. one-tenth, of
the leuga itself ; these are facts which point to connection
with the khet and the medimnus rather than with the
Greek aroura and the Roman jugerum.

II. THE NORMANDY CUSTOMARY ACRE.

Passing on to Normandy the most prevalent and
typical acre—the ' *Normandy acre* '—is in the form of
1 × 10.   It consists of 160 perches of 7·15 m. and so
has a furrow of 286 m. and an area of 81·715 ares.   It
is therefore in area the *double of the English statute acre
put into the form of* 1 × 10.   An English *half*-acre
1 × 10 (of 142–143 m. in furrow) thus becomes the rood
or verge of the Normandy acre.

And further (as if following the Breton example),
the Normandy verge or rod of 7·15 m. is almost exactly
the diagonal of the square of the English statute rod of
5·025.

FIG. 21.

With regard to the relation to itinerary measures it must be specially noticed that it is the *Normandy furrow* which is in direct connection with the itinerary measure, being $\frac{1}{8}$ of the *leuga of higher standard*, while the furrow of the English statute acre, 201 m., is $\frac{1}{8}$ of half the diagonal of the square leuga of higher standard —eight furrow lengths, *i.e.* 1609 m., making the English statute mile. Thus the relation to the itinerary measure is maintained on both sides the Channel in the same way as in the case of the Cornish and Breton acres, but by a reverse process.

In passing from the Breton-Cornish pair of acres to the Normandy-British pair of acres, we seem to have passed from a probable connection with the *khet* and the *medimnus* to quite a fresh one, viz. with the *Greek aroura* and the *Roman jugerum.* The Normandy verge or rod of 7·15 m. is almost exactly $\frac{1}{5}$ of the Roman actus and $\frac{1}{10}$ of the long side of the two squares of the jugerum, viz. 71·1 m.

It is of slightly higher standard. The result follows that the square of the British furrow of 201 m. ($\frac{1}{8}$ of the half-diagonal of the square leuga) would contain within it 16 Greek aroura or 36 Greek plethra in their proper shape as squares, whilst the square of the furrow of the English *half-acre* in the form of 1×10, viz. 142–143 m., would contain without change of form 4 Roman sortes or 8 Roman jugera, but of slightly higher standard. But how far these facts taken alone would give ground for an inference of Greek or Roman origin, and, if of either, of *which*, must be left to a later stage of this inquiry. We may have to go back to an influence wider than both.

In the meantime the map (fig. 21) will show the

range of the prevalence of the Normandy acre.   On the
whole it does not seem to travel very far from its special
home.   But its *verge*, the English half-acre (1 × 10),
wanders much further.

The *Chartrain* setier, in the form of 1 × 5, with a
slightly diminished standard, 4 × 20 of a rod of 7·04 m.,
and an area of 39·628 ares, can hardly be regarded as
other than two English half-acres or verges of the
Normandy acre, while the *Lorraine* arpent or ' *jour* '—
1 × 10 with an area of 20·44 ares—regains the full
standard of the single *half-acre*.

Finally, the prevalence of the same half-acre as the
' morgen ' of Frankfort-on-the-Main, 4 × 40 of a rod
of 3·55 m. ($\frac{1}{10}$ of the side of the Roman actus), having
an area of 20·25 ares, seems meant to remind one that
it was at home in a thoroughly Romanised region, and
that, even though sporadically traceable back into once
German territory, it may not be of German origin.

III. THE 329 M. ACRE IN TWO HALF-ACRES.

This acre is represented on the Continental side of
the Channel almost solely by its *half-acre* in the 1 × 10
form, with a furrow of 233 or 234 m. and occasionally
with a higher standard of 238 m., being 4 × 40 of a
rod of from 5·82 to 5·95 m., and having an area from
54·702 to 56·746 ares.

In the Département of the *Seine et Oise* it occurs
with a furrow of 234 m. measured with 3 × 30 of the
Breton rod of 7·8 m.   I am not aware that it occurs
in any other form than that of the half-acre 1 × 10.
Its interest lies mainly in the fact that on its lower
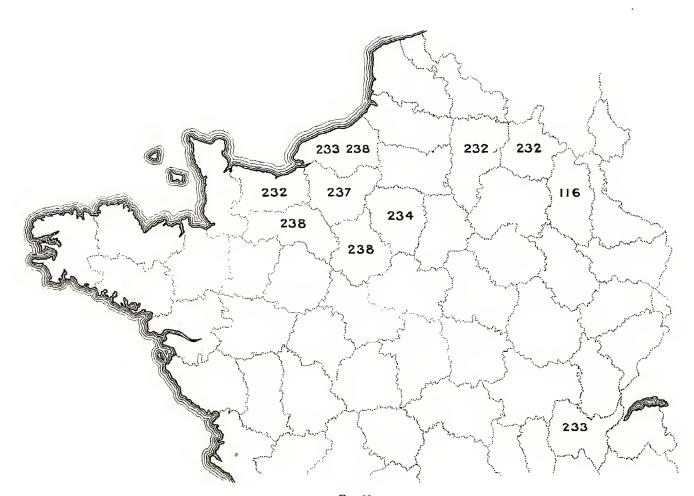
Fig. 22.

standard its area equals 2 Greek medimni or 5 Greek modii of corn-land.

Nor can we overlook the fact that in its higher standard the *whole acre*—the ' *faltasce* '—occurs again in the corn-growing country at the mouth of the Danube (Jassy), where the two half-acres, 1 × 10, make an acre in the form of 1 × 5. It there is reported by Martini to consist of two half-acres, each 12 × 120 *stingeni* of 1·98 m., or 4 × 40 ' *predjine* ' of 5·94, the rod of the French half-acre, and with an area of 113 ares.

Its appearance in this region may have a direct historical meaning, but there can be little doubt that it owes its existence to the fact that it contains an area of 4 Greek medimni and that at the same time in its form of 1 × 5 it contains 10 modii of corn-land in their normal form of two squares. The square of its furrow, moreover, would contain 16 Egyptian khets in their normal square, just as the square of the Breton furrow would contain 9 such khets. Its relation to the Breton arpent rather than to the Normandy acre seems thus to be distinctly indicated, both by its connection with the khet and medimnus, and its occurrence in the *faltasce* of the Danubian district.

In the meantime the map (fig. 22) will show the range of its somewhat sporadic appearance among the other associated acres in the corn-growing districts of France.

IV. THE DORSET OR STADE ACRE.

This important acre, as might be expected from its direct connection with itinerary measures, was widely spread over France, sometimes in its natural form as a 1 × 10 acre with a furrow of one stade or 185 m. in

length, at other times in the form of 1×5, *i.e.* two *half-acres* 1×10—with a furrow of 131 m.—and more rarely in the form of a square. It sometimes doubles itself like the Normandy and Breton acres by putting 4 of its half-acres together and so regaining the form of 1×10 with a furrow of 262 m. The area of the true stade acre is 34·333 ares, and that of its double is 68·666 ares.

From the map (fig. 23) it will be seen that in its form of 1×5 it keeps mainly to the North, though reappearing in the South of France, whilst in its natural form, 1×10, it becomes prevalent in what we may call the Burgundian district on both sides of the Jura, including Switzerland, as we shall presently see. It also occurs, as it naturally would do, outside the corn district, in a square form over a considerable region.

The stade was so prominent an itinerary measure, being $\frac{1}{12}$ of the leuga and $\frac{1}{8}$ of the Roman mile, that its far wider prevalence than that of the other Armorican group of acres cannot be surprising.

V. THE GROUP OF ACRES.

One cannot help noticing that whilst these customary associated acres spread over different parts of the corn-growing districts of France they seem to accumulate in the Départements of Calvados and the Seine-Inférieure, as if gathering for the purpose of crossing the Channel together into Britain ; or rather as if this were the point of passage from either shore.

In those Départements not only are all the four above-mentioned acres in evidence, but also the Jersey

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Fig. 23.

acre, with its furrow of 268 m., appears in its half-acre form 1×10 with a furrow of 190·4 m. and an area of 36·08 ares.

In the Département of the *Seine-Inférieure* the group of associated acres has the further addition of the *West Derby* 275 m. acre without change of shape and varying in furrow from 275 to 279 m.[1]

We miss only on the French side of the Channel from the British and Armorican group of associated acres the Northumbrian or Irish acre with the 256 m. furrow, perhaps the most interesting because most mysterious of the British and Irish group.[2] But it occurs, and without change of form, in the Channel Island of Guernsey, with the additional information that 5 Guernsey acres make a manorial *bouvée*, and 12 bouvées a *corvée* of 60 acres with an area of 3933 ares.

The position of the so-called Irish acre of 65·62 ares is so prominent among British customary acres that it is worth while to examine carefully the Guernsey example of it and the larger agricultural unit derived from it.

It is very easy to see that the area of the *corvée* of 60 acres, viz. 3933 ares, is equal to 144 Egyptian khets or Greek medimni.

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[1] *Tables des Rapports des Anciennes Mesures Agraires avec les Nouvelles,* par F. Gattey, 3me Édition, Paris, 1812. 'Ces tables sont extraites des tableaux de la comparaison des anciennes mesures de la France avec les nouvelles, dressées par les Commissaires nommés à cet effet dans chaque département.'   [2] See below, p. 247.

CHAPTER V.

THE ASSOCIATED GROUP OF ACRES LIMITED TO ITS OWN DISTRICT AND ITS INDIVIDUAL MEMBERS TRACED EAST-WARD ALONG THE LINE OF THE LEUGA INTO THE CORN-GROWING REGIONS AT THE MOUTHS OF THE PO AND THE DANUBE.

I. THE RHENISH 1 × 10 ACRES AND THEIR GERMAN NEIGHBOURS.

THE question now arises how far the group of these associated acres common to both sides of the Channel can be traced further East.   The extent of the prevalence of the group is most important, but it is worth while to follow the individual acres as far as we can.

A reference to the maps will show that East of the boundary of Normandy, that is to say, of the Départements of the *Seine-Inférieure* and *Eure,* the 1 × 10 acres seem suddenly to disappear, and to give way to those in a square.   In *Picardy* and *Artois*—the Départements of *Pas de Calais, Somme,* and *Oise*—they are conspicuously absent.

Happily we have still the guidance of the French Official Tables, as at the time when they were made the geographical area of the French departments extended to the Rhine.   The Moselle Valley and the districts comprised in the Départements of the Rhine and Moselle, *La Sarre, La Meurthe, des Vosges,* and *Mont-Tonnerre,* cover the ground from Trèves to the Rhine and the Main—a thoroughly Romanised district, and the meeting-

place of Roman and German influence, and the scene
of the great battle-ground between them. It also is
peculiar in the fact that whilst in the Roman itineraries
the distances between the stations on the main road
from the south as far as Mainz are nominally stated
(although really in leugæ) in Roman miles of 1000 paces,
those from Cologne to Coblenz, and across country as
far as Trèves and Rheims are stated openly in *leugæ*.

And there is a passage in the *Notitia dignitatum*,[1]
quoted by Mommsen and Meitzen, in which it is stated
that at that date the Romans had extended their pos-
sessions for 80 leugæ beyond the Rhine. ' Nam lxxx
leugas trans Renum Romani possederunt.' So that, as
Mommsen observes, the Roman occupation or influence
must have reached eastward as far as Fulda. Thus,
reckoning directly in leugæ in this district was prevalent
in the fourth century.

Throughout the district of which Trèves was the
centre the stade acre, varying in furrow from 184 to
188 m., and 1×10 in form, was the most prevalent.

The verge or quarter of the Normandy acre, as
already mentioned, occurs however as the Jour of
Lorraine. It is found again in the Départements of
La Meurthe and the Vosges, and crossing the Rhine,
according to Martini and Doursther, it occurs again as
the Feldmorgen of Frankfort-on-the-Main with a furrow
of 142·4 m., and area of 20·25 ares, in company with
a Waldmorgen (also 4×40) with a furrow of 180 m.
and an area of 32·55 ares.

The *Waldmorgen* is in area very near the half-acre of
the Northumbrian and Irish and Guernsey acre with the

1 Seeck, p. 253 ; Meitzen, i. p. 390.

furrow of 256 m., but it may possibly be a stade acre
with a slightly reduced area and length of furrow, as the
English form of it also may be.

The Morgen of *Homburg*, according to Martini, was
4×40 Ruthen of 3·45 m., and therefore had a furrow of
138 m. and area of 19·06 ares.   It seems, therefore, to be
a rood of the British 275 m. forest acre.

4×40 *of* $3 \cdot 45$ *m*

138 m.

19·06 ares
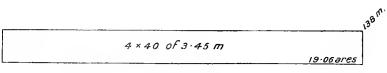
FIG. 24.

Still within the region of direct Roman influence and
in the comparatively near neighbourhood of Frankfort
is *Fulda*.   Before 1872 the customary acres of Fulda are
reported as follows :—

The *Tagewerke* of two Morgen is hardly the stade
acre of higher standard in the form of 1×5, the Morgen

Morgen 4×40 *of* $3 \cdot 39$ *m.*

135·6 m.

18·437 ares

36·874 ares

Tagewerke of 2 Morgen
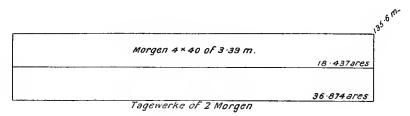
FIG. 25.

being its $\frac{1}{2}$ acre in the form of 1×10—if it is so, it is
an exaggerated form of it.

The GOTHA *Waldacker* is practically the stade acre
of 185 m. of slightly lower standard, *i.e.* with a furrow
reduced to 184 m.   (See fig. 26).
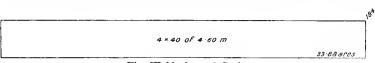
The *Feldacker* of Gotha equals 140 Feldruthe of

4·026 m. with an area of 22·7 ares and does not seem to belong to the 1 × 10 acres.

In *Lippe-Detmold,* before 1857, the customary acre was the ' Scheffelsaat ' of 4 × 40 Ruthen of 4·63 m. with an area of 17·165 ares. Its furrow was a stade of 185 m. It was therefore a half of the stade acre longitudinally divided.

In *Oldenburg* the ' Altesjuck ' is reported to have been 4 × 40 of a Ruthe of 5·91 m., making a furrow of 236·4 m., with an area of 56·03 ares. This is again the half-acre of the 329 to 335 m. acre of higher standard.

When we have added the *Würzburg* and *Nuremberg* acres with a furrow of 146 m. (half that of the British

4 × 40 of 4·60 m

184 m

33·88 ares

The Waldacker of Gotha.
Fig. 26.

292 m. acre) and that of *Saxe-Meiningen* with a furrow of 170 m. we seem to have exhausted the sporadic 4 × 40 or 1 × 10 acres reported as in use in North and Middle Germany.

It must be confessed, however, that no longer having the guidance of the French Official Tables the information as to the 1 × 10 acres of Germany may be incomplete. Any question how far they were really at home in North Germany must be held in suspense.

There are several 1 × 10 acres reported in Switzerland.

The Zurich acre for gardens, 6 × 60 of a rod of 3 m., with a furrow of 180 m. and area of 32·405 ares, seems to be the half-acre of the Guernsey acre, or possibly a diminished stade acre. It occurs again at Basle with

a furrow of 183 m. and area of 33·39 ares, very near to the stade acre.

There are others which though in the form of 1×10, do not seem to occur elsewhere, *e.g. Berne* 6×60 of a rod 293 m. with a furrow of 176 m. and area of 31 ares, the rood or quarter of which occurs at *Strasburg*.

Before passing from the geographical range of the associated 1×10 acres of the French Tables and the imperfect German authorities, the reader must be reminded of the fact that the great corn district of France through which they stretch was surrounded by other districts in which the vine was the predominant object of culture, and in which the agricultural unit naturally takes the square form.

We have already noticed that the Breton furrow of 156 m. was connected with a series of apparently square acres with sides of half that length.

So also the furrow of the Normandy acre (286 m.) was connected with a series of square arpents with $\frac{1}{4}$ of the Normandy furrow (71·5 m.) to a side and with an area of 51·072 ares. This was an arpent prevalent enough to be adopted nationally before 1792 as the ' *Arpent d'ordonnance des eaux et forêts* ' of Paris. It was, moreover, practically the same area as that of the Roman sors of two jugera.

Again, a square of $\frac{1}{4}$ of the furrow of the 233 m. half-acre was known up to 1793 as the ' *arpent de Paris* ' with an area of 34·189 ares, sometimes with slight increase to 35·466. This was the area of the 1×10 stade acre with a furrow of 185 to 189 m. put into a square.

We therefore end this subject with the reminder that the long furrow of the 1×10 acres which seems

so readily to be explained as a division of the leuga or stade or of the diagonal of their squares may have no monopoly to this distinction.

The shorter furrows of the square arpent of the surrounding districts may often be divisions of prevalent itinerary measures. And thus as both may have direct relation to the same itinerary measure it would not do to conclude from the presence of both in the same district that the one form has been directly derived from the other, though that is quite possible in some cases.

The form taken by the prevalent agricultural unit must have been mainly fixed by the character of the land and climate of the country and the dominant crops for which in the long course of many generations and centuries it has been found to be adapted. But at the same time, whatever the form of the unit in its actual dimensions, the relation to the prevalent itinerary measure may have been just as naturally preserved.

II. THE LINK BETWEEN ARMORICAN 1 × 10 ACRES AND THOSE OF THE PO VALLEY AND THE DELTA OF THE DANUBE.

Having no longer the help of the French Official Tables, on which we relied for knowledge of the customary acres in use before the French Revolution in the various Départements of France, and having attempted imperfectly to follow the 1 × 10 acres into Germany by means of such information as the more general metrological treatises of Martini and Doursther afford, the reader may naturally ask for information as to the antiquity of their prevalence in the corn-growing districts where they seem to have been at home. For this we are thrown more directly upon historical records.

L

Apart from historical evidence it might be argued
that even if it were granted that the French customary
acres belonged to an early system of tribal agriculture
like that in Wales in the tenth century, it would not
alter the fact that they must have been again and again
submerged under the convulsions and economic changes
involved in military conquest and political action.

These convulsions, it might be argued, may have
wiped older agrarian customs from the slate and sub-
stituted others for them.   And in some cases it may
have been so.   The French Commission of Inquiry
which produced the valuable Tables, was appointed for
this very object.   Yes, but in spite of revolutionary
legislation the force of custom in each commune has
remained so strong that the network of the open field
system with its scattered strips and its *vaine pâture*
and customary acres still remains on the ground.   It is
not only in Brittany that it is so.   As already said, you
have only to climb the tower of Chartres Cathedral and
to look across the vast open fields of the rich corn
country all round, and then to call at the mairie and see
the map of the commune, and spend a franc in buying
a copy of the ' Usages Locaux ' of the district to be
convinced of this, and to receive an impression never
to be forgotten.   The same may be said of the stretch
of the open field enclosed by the bend of the Rhine as
viewed from the hill behind the old Roman town of
Andernach.   And when we consider that this open
field system of husbandry in holdings of scattered strips,
in one form or other, has been the common possession
for ages not of one race only, but of Celts and Germans,
and Slavs and Russians, to say nothing of the Farther
East, we need not altogether despair of finding in

historical records traces not only of its existence but also of the route of the travel of agricultural details connected with it from the East to these Western corners of Europe.

To begin with, one element of permanence has no doubt been the fact that for more than 1000 years, during the long reign of the manorial system both in England and on the Continent, the services of the peasantry under the open field system of agriculture was intimately connected with the ploughing and sowing of a certain number of strips or acres in the open field or on the lord's demesne.

A typical and potent instance in point is the wide prevalence in manorial records of what in the Saxon phrase of the ' Rectitudines ' was the ' *gafolyrth,*' *i.e.* the special service of both free and semi-servile tenants in the ploughing, sowing, and reaping of so many acres and the carrying of the produce to the manorial barn *apart from the ordinary weekwork on the lord's demesne* of the more servile class of tenants.

In the eighth century Polyptiques of the Abbeys of St. Germain des Prés and of Prum, and more definitely still in that of Rheims, there is evidence enough of the necessity to define not only how many acres were to be ploughed and sown by the tenants, but also in some cases what the size and shape of the acres were to be.

Especially needful was it in the case of the Abbey of Rheims, because in the peculiar district over which the estates of the Abbey were scattered, we know from the French Tables that there was an unusual mixture of customary acres of all shapes and areas. As in the English case of Northamptonshire (above p. 113) it became needful to describe the acres of each district liable

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to certain customary payments, so in the case of the Abbey of Rheims it was especially necessary to describe for each property the acre by the ploughing of which the services were to be rendered. One point comes out clearly. The Abbey could not impose upon its tenants a uniform acre of its own. Custom was too strong to admit of such a course. The Abbey had in each case to adapt its arrangements to the customary measures of the district in which the property happened to lie.

The first entry in the Polyptique of St. Remi, describes the services of the tenants of the estate of *Adenaius* on the Marne.

> *Hrotmannus* ingenuus tenet mansum ingenuilem. (1) Arat ad hibernaticam sationem *mappam* l. Continentem in longitudinem perticas xl in latitudine perticas iiii. Ad estivaticum similiter. . . .

The *mappa* was in this case an acre of the typical shape of 1×10, measured by 4×40 perches. Of the other tenants of this manor it was enough to say ' *tenent mansum similiter.*'

On six estates of the Abbey the ' mappa ' was of 4×40 perches. On five it was 6×60. Thus on twelve estates out of twenty-eight the acres were of the 1×10 form. But on six other estates the mappa was 4×100 and on the rest were other varieties.

The Polyptique describes the estates and the services as they existed about the middle of the ninth century. But St. Remi died A.D. 530, and there can hardly be a doubt that the customary acres described went back to the time when the several estates one after another were at different dates given to the Abbey, carrying their local customs with them.

Following further the traces of the ' Gafol-yrthe ' in other records, the area to be ploughed was known

sometimes under the name of the ' anzinga ' or ' ande-
cena.' We find it under the latter name in the services
of the free tenants of the Church as defined in the well-
known passage in the Bavarian Laws of the seventh
century. It will be noted that the itinerary measure
is still the leuga.

(S. 13.) This is the tribute for *arable* according to the estimation
of the judge.

.   .   .   .

Legal andecenæ (the pertica being of 10 feet) 4 pertica in breadth
and 40 in length [he is] to plough, to sow, to fence, to gather, to carry,
and to store. For spring crops each *accola* is to prepare for two
modia of seed and sow, gather, and store it. . . . Let them give
posthorses, or go themselves wherever they are bid. *Angaria* (carry-
ing services) with waggons as far as 50 *leugæ*. They cannot be
compelled further.

It is well worth while to examine the *andecena* of
this passage carefully. It was to be 4×40 of a pertica
of 10 feet. But of what feet ?

If we regard the district as part of the Roman Agri
Decumates we should guess that the pertica of 10 feet
was the Roman *decempeda*, and the foot the Roman
foot of ·295 or ·296 m.

And when we turn to the customary measures of
Bavaria the guess is confirmed by the statement of
Martini that the customary Ruthe of Munich, like the
rod of the andecena, was still of 10 feet, the Munich
foot being ·292 m.; whilst the foot of Augsburg was
·296, and that of Salzburg ·298 m. We can hardly be
wrong therefore in regarding the foot of the andecena
as having been the Roman foot and the pertica as
having been the Roman decempeda.

The length of the furrow of the andecena would
thus be 118 m., or if the foot were to be taken at
·292 m., the furrow would be 117 m.

The andecena is therefore no stranger.   It is the rood or quarter of the half-acre of the 330 m. acre in the form of 1×10 with a furrow of 233 m. which we have seen to be one of the associated customary acres in use on both sides of the English Channel, and also found again in the great corn-growing district on
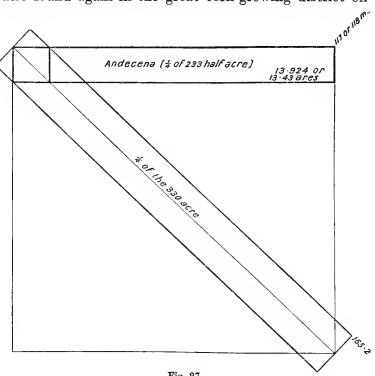
Fig. 27.

the northern shore of the Black Sea.   Its area is the half-medimnus in the form of 1×10.   The andecena is not the only historical acre of this Bavarian district.

In a twelfth century MS.[1] or fragment of a chapter of Bavarian Law, quoted by Pertz is a description of

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[1] Pertz, 495.

the jugerum of 6×30 pertica of 15 feet, *i.e.* two 1×10 half-acres each of 3×30, making a 1×5 acre, as in so many Armorican instances.

Taking again the foot as ·292–·295 m. the rod would be 4·38–4·44, making the jugerum in form and area as below—2 half acres 1×10.

131·4 or 133·2 m.

34·33 ares
or 35·48 ares
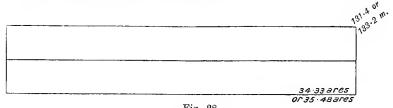
Fig. 28.

This is in fact the Dorset or stade acre in the shape 1×5 assumed by it so often on the Gallic side of the Channel.

These two Bavarian acres of seventh and twelfth century records are thus known to us independently of modern customary usage. But they have nevertheless left traces behind them.

According to Martini the customary Juchart of the kingdom of Bavaria as fixed in 1809 (including Munich and Augsburg) was 34·0727 ares and in form a square of 400 rods of 2·92 m.

Doursther mentions an *ancient Jauchart* of Augsburg of 16,000 square ancient feet, and with an area of 14·0366 ares. The ancient foot (Werkschuh) of Augsburg is stated to be the Roman foot ·296, so that the furrow would be 118·4 m. (See Fig. 29.)

If we could trust Doursther's ancient Jauchart to be in actual customary use and not merely as a tradition of the *andecena*, we might say that both the historical acres had survived to modern times, the

andecena remaining after 1200 years the same in area
and shape as of old, the other stade acre retaining its
old area but (since 1899) turned into a square.
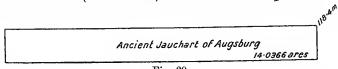
Fig. 29.

Having got so far as this, we may fairly, with some
confidence follow the evidence of the customary acres
further in trying to answer the question whether we
may trace the trail of these Bavarian acres further
down the Danube Valley or over the Brenner Pass into
Italy. Perhaps both ways may be open.

If we follow the faithful guidance of the leuga we
shall turn up the valleys of the Inn and the Enns on
our way over the Brenner Pass into Italy. From the
Urkundbuch of the Enns Valley (1, 74) *we learn* that the
leuga was the itinerary measure of the Alpine district
in the eighth century.
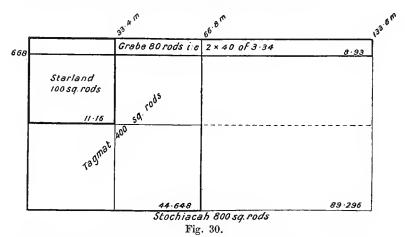
In the customary measures of Innsbruck we have
the familiar foot of ·334 m. and Ruthe (of 10 such
feet) of 3·34.

The areal measures are stated by Martini to be :—

				Square rods	Ares.
Grabe	..	..	..	80	8·93
Starland	..	..	..	100	11·16
Jauch	..	..	..	360	40·183
Tagmat	..	..	..	400	44·648
Stochiacah	..	..	..	800	89·296

The *Stochiacah* of 800 Ruthen would naturally take the
form of two squares, and the furrow of its long side would
then be of the same length as that of the Bavarian twelfth
century historical stade acre of full Roman standard.
And the *Grabe* would be $\frac{1}{4}$ of it with the same furrow.

The two Tagmat remind us that hay is the ruling crop. Then, as now, all through the Alps the amount of hay possessed by the peasant rules the number of cattle which can be kept through the winter.

Fig. 30.

Cf. Aranzada of Madrid, 400 square Estadals of 3·34 m. *i.e.* 44·72 ares.

The *Starland* is the area for ploughing and the sowing of ' *corn-star* ' of seed, and it is of the same area as the Greek corn-land modius of higher standard.

The *Jauch* is identical with the English statute acre, both in area and in its 1×10 shape, and by its presence here in the Tyrolese Alps we realise that its area is equal to *three of the andecena* reckoned on the foot of ·292 m.
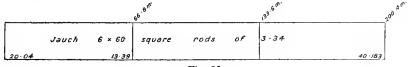
Fig. 31.

Divided longitudinally into 3, the *Jauch* would make an andecena in the form of 1×30, *i.e.* 66·8 $\times$ 200·4 m.

in both area and shape almost the exact counterpart of Dunwal's ' tir,' 1000 of the short end of which made his milltyr.

The *Meile* of Tyrol is recorded as 10,691 m., *i.e.* 32,000 feet of ·334 m., *i.e.* 80 of the furrows of the Grabe.

Beyond the culm of the pass, on the Italian side in the valley of the Adige lies Botzen or Bolzano, where the agrarian measures seem to be the same as those of Innsbruck, the rod being 3·34 and the foot ·334 m., and the mile 10,691 m. and the Jauchart 35·99 ares (4 Grabe) making the acre 1 × 5—two half-acres of the stade acre of higher standard.   Lower down the valley lies *Trent,* and here the twelfth century Bavarian jugerum appears again under Italian nomenclature but identical both in area and shape.   The *pio* of Trent is described by Martini as 720 tavole or square rods of 2·167 m. and an area of 34·84 ares.   Doursther gives the area as 33·827 ares.
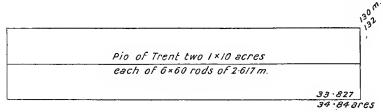
Fig. 32.

This is again, like the Botzen Jauchart, a stade acre in the form of two half-acres and containing 4 of the Innsbruck Grabe.

Still further down the valley we have record of the customary acre or *campo* of *Valvasone.*

It is 8 × 80 tavole = 27·86 ares.

This equals in area the Greek medimnus or 2 ande-

cenæ put into the normal shape of 1×10.   It is the
same in shape and on a slightly higher standard the same
in area as the rood or quarter of the customary acre with
329 furrow, but in standard it approaches more nearly

Campo di Valvasone   8 × 80   of   2·08

166·9ᵐ

27·86
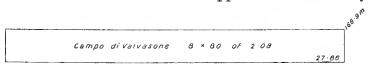
Fig. 33.

that of the Jassy faltasce.   And thus we arrive at the
remarkable result that as at the end of the route by the
Danubian Valley we find this 329 acre of Britain and
Armorica in the shape of 1×5 but on the higher
standard, so following the guidance of the leuga over this
Alpine pass we drop into the Po Valley and almost into
Venetian territory to meet again with a rood or quarter
of this same customary acre in its unaltered form of
1×10, as the customary acre of the Italian end of the
pass.   It is in fact the Greek medimnus over again in
the 1×10 form.

Lastly, to add one more link to the chain before
examining the Venetian acres, if we follow the Adige
to its mouth at *Rovigo* we find a *campo* of 44·644 ares,
i.e. equal to the Tagmat of Innsbruck of 4 starlands
and a biolca of 66·96 ares equal to 6 starlands, confirming
the fact that the agrarian measures on both sides of
the pass are intimately connected and belong to the
same system.   The starland of Innsbruck is thus the
unit of both the campo and biolca, and it is the corn-
land modius of 11·16 ares, *i.e.* of the higher standard.

III. THE VENETIAN ACRES.

Thus step by step by Bavarian historical records
and reliance on the customary acres on the route,

following the faithful guidance of the leuga, wanderers of the associated British and Armoric group of acres of 1×10 form have been traced along the line of the Brenner Pass into *one* of the *two* Italian districts [1] where the local customary acres retain the shape of 1×10,

Andecena of Bavarian Laws

13·43 – 13·93 ares

116·8 m.

Andecena (1×5)

Campo di Valvasone (venice)

83·5 m

13·93 ares

166·9 m.

27·86 ares
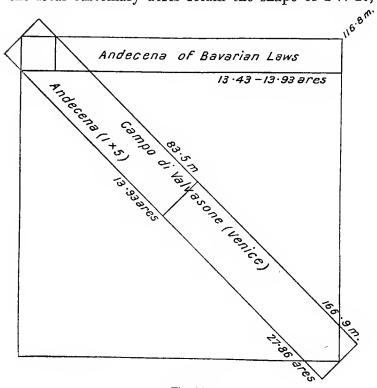
Fig. 34.

for such the customary acres of Venice are reported to have been.

The four customary acres of Venice are reported by Martini as follows :—

(1) There was the already mentioned *campo di*

Valvasone, which we noted to be equal in area to two *andecenæ* of the Bavarian Laws and one-fourth of the 329 m. acre. It was also equal in its area to the Greek medimnus put into the form of 1×10.

(2) There was the *migliaio di ghebbi, i.e.* 10×100 ghebbi of 1·565 m.

Fig. 35.

Here we have repeated in area and form and length of furrow one of the two half-acres forming the Breton arpent. Here also it is connected with a local itinerary measure. The mile of Modena of 1569 m., *i.e.* 10 of the Venetian and Breton furrows, was half the diagonal of the square of the leuga of 2220, and $\frac{1}{10}$ of the Danubian posta.

(3) The '*campo di* 840 *tavole*' with the same
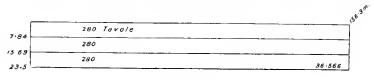
Fig. 36.

furrow of 156·9 m. with an area of 36·566 ares, being $\frac{3}{4}$ of that of the Breton arpent.

This is almost the exact counterpart in area and structure of the ancient 'journal' of Vannes and Rennes, like it retaining the furrow of the Breton arpent but having only $\frac{3}{4}$ its breadth.

(4) The *migliaio di passi* containing 10×100 paces of 1·738 m. and an area of 30·229 ares of the same

area as that of Verona but in the form 1×10 instead of 1×5.
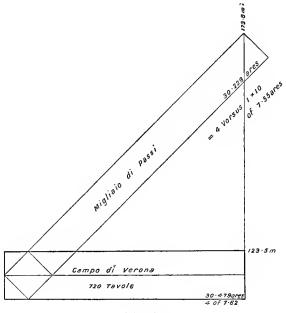
Fig. 37.

The *Venetian* mile is 1738 m., *i.e.* 10 of the furrow of this Venetian acre.   These two acres of Venice and Verona are in area half the Breton arpent of 60·780 ares which was a square of half the Breton furrow of 156 m., and consisted of 10×10 of the Breton corde of 7·8 m.

Thus, whether there may have been any racial connection between the Veneti of the Armorican Peninsula and the Veneti of the Po Valley or not, the fact has to be accounted for in some way or other that the 4 Venetian acres of the Po Valley at one end of the line of the spread of itinerary and agrarian customary

units of area are similar to the customary acres at the
Armorican end of the line.

Setting aside the temptation to accept the direct
racial connection it would be still more difficult to
ignore the absolutely independent archæological evi-
dence of more or less direct economic connection during
what Sir John Evans has taught us to regard as the
' *La Tène* ' period. He has traced the connection of the
late Celtic remains in Gaul and Britain with the La Tène
civilisation of the region at the head of the Adriatic.
Nor would the recognition of this particular line of
influence be any reason for ignoring the possibility of
another which may also have been open through the
Valley of the Danube from the great corn-growing dis-
trict at the mouth of the Danube, one of the evidences
of which may well be recognised in the spread into
Gaul and Britain of the Celtic coinage which, traceable
in part to that of Philip of Macedon, must probably
have found its way westward by trade routes already
open.

No doubt a radical distinction must be recognised
between influences travelling along trade routes and
those deeper influences which have become part of the
permanent economic possession of a people or race
dwelling with them wherever they dwell, and travelling
with them as a part of them wherever they go, and it
may thus well be that the fact of the resemblance of
the customary acres of the Veneti of the Valley of the
Po and the Veneti of Brittany, otherwise so striking,
is more likely to have been the result of common and
deep-seated Celtic or even wider custom than of
commercial intercourse.

IV. THE PLOUGH AND THE PLOUGH-TEAM OF EIGHT OXEN
IN THE PO VALLEY.

We have now to seek for any glimpse that may be
got from ancient sources as to the peculiarities of
agriculture in the Venetian region of the Po Valley,
where the Breton acres are so remarkably repeated in
the customary measures of to-day.

The distinctive feature of the Venetian acres is the
prevalence of the 1×10 form, and this, one readily
infers, must have had some connection with the size of
the plough-team, while, on the other hand, the character
of the agriculture in the delta, so to speak, of the Po
Valley may have had something to do with the length
of the furrow. Not everywhere in Italy is corn the
ruling crop or the lie of the land consistent with the
prevalence of the long furrow.   What can be learned on
this point from the agriculture of the Po Valley and
the statements of Roman writers as to what it was like
in their day ?

So far as direct statement is available it is clear
that the Roman jugerum was connected with the single
yoke of two oxen.   And Meitzen has pointed out that
the square form of the actus was the necessary result
of the system of cross ploughing described by Pliny
(XVIII. xx.).[1]

That the actus of 120 feet was considered by the
Romans as a long enough furrow for the single yoke of
oxen to accomplish at one breath shows clearly that
the single yoke and the actus and jugerum were bound
up together. A longer furrow would have involved a
larger team.

1 Meitzen, i. 227.

Pliny was fully aware that whilst the actus and single yoke were typical of Roman agriculture, much must always depend on the nature of the country and the soil. After alluding to Egypt and to the rich district inundated by the Euphrates and Tigris and noting that in Syria they plough ' tenui sulco ' he contrasts this easy ploughing with the fact that in many places in Italy *teams of* 8 *oxen sweat at single ploughs* (*cum multifariam in Italia octoni boves ad singulos vomeres anhelent*). He adds that in all things connected with agriculture and especially in this matter of the size of the team, the proverb is true ' *Quid quœque regio patiatur* ' (XVIII. xvii.).

Pliny, moreover, speaks of an improved plough (*non pridem inventum*) not long ago invented in Rhætia, to which in Gaul two wheels had been added, making what were called ' *planarati*.' The reference to Rhætia is interesting if the clause in the Alamannic Laws (' Additamenta,' xcix. 2) imposing a penalty of 3 solidi upon anyone who should injure the front wheels (*rotas primarias*) of a ' *carruca* ' may be taken as referring to the plough, and particularly to the ' planaratum,' the wheels of which were added by the Gauls to the Rhætian plough.

Pliny seems to infer that this improved Rhætian plough was used in Italy, and though he does not mention the Po Valley directly, it is difficult to see where else the team of 8 oxen labouring with panting breath at the long furrow would be more likely to be seen.

The word *carruca*, whether applied to a chariot or a plough, seems strictly to mean *four to a yoke,* as in the case of the *quadriga* (quadrijuga) of the Chariot of the Sun and of the coins. The word apparently became

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permanently applied to the plough, giving rise to the French ' *charrue.*' Whether retaining the meaning of four to the yoke or not, it seems to imply more than a single pair of oxen. The team of 8 oxen of the Welsh Codes, with its ' long yokes ' of 16 and 18 natural feet, to which 4 oxen were yoked abreast, finally entered into the construction of the *carrucate* of mediæval taxation and manorial services, thus becoming wrapped up with the open field system and the economic life of the British village community.

The word *carruca* may not have been applied in Pliny's time to the team of 8 oxen, described by him as prevalent ' in many places in Italy .' As already said, he does not expressly mention the Po Valley, though he seems to infer that the improved plough had been imported from Rhætia. The word ' carruca ' does appear, however, to have become, in North Italy at least, associated, if not with the plough-team, with a typical team of 8 oxen. The festal chariot in which the military standard was paraded on great occasions had 8 oxen in its team. Under the word ' *carrocium,*' Du Cange refers to the Milanese festivities of the eleventh or twelfth century at which the ' *carrocium* ' bearing the flag of the General was drawn by 4 yokes of oxen. ' *Hoc currum quatuor juga boum trahunt* '—*i.e.* a team of 8 oxen whether yoked 4 abreast or not.

Whether, therefore, the word *carruca* meant ' four to the yoke ' or not, and whether it was applied to the 8 oxen *plough-team* or not, the team of 8 oxen was no stranger in later times in North Italy. Dr. Bürger, who followed Dr. Young in the detailed study of the agriculture of North Italy in 1830, describes the large plough-team and the *wheel plough* as in general use in

the Venetian provinces. The plough he describes as being of the Rhætian swing plough type, but so clumsy as to require often 6 oxen to the team (p. 43).

Notwithstanding the strength of the team he describes both men and team almost in the words of Pliny as *tired out*,[1] while the field itself looked as though it had been rooted up rather than ploughed. Near Mantua he states that 3 or 4 pairs of oxen were required to draw even a well-constructed plough, while on the other side of the Po 5 or 6 pairs of oxen were considered necessary.[2]   The 1 × 10 customary acres of the Venetian provinces were thus coincident with the larger plough-teams.

With regard to the Rhætian swing plough to which Pliny states that the Gauls had added the two wheels, the student who desires further to pursue the subject will find ample evidence as to its character and the district over which its use was spread, in Dr. Braungart's elaborate work [3] founded upon searching personal investigation on the spot, and especially in the Bavarian and Alpine districts, from which this peculiar form of plough seems to have sprung.

He points out how what he calls the Bavarian ' Kehrpflug ' or swing plough with its two mould boards was specially adapted for ploughing a mountain slope and the formation of the peculiar long terraced strips known to us as linches, which are so prevalent a feature in the Inn Valley, and with which every frequenter of

1 'Mit dem Pflugarbeit abpla-gen,' p. 236.

2 *Die Landwirthschaft in Ober-Italien,* von Dr. Johann Bürger. Wien, 1851. I. pp. 192–196 and pp. 236 *et seq.*

3 *Die Ackerbaugeräthe in ihren praktischen Beziehungen wie nach ihrer urgeschichtlichen und ethnographischen Bedeutung.* Heidelberg, 1881.

the Tyrol or the Engadine must be familiar.   There are
linches on the sides of our chalk downs, and they abound
across the Channel, as every traveller by rail from
Calais to Paris must know, but their natural home is
in the Alpine valleys, where the lower slopes of the
mountain sides of the narrow valleys are the only
available ground for the necessary corn crop.   Both
in the Alps and in the case of the linches of our own
chalk downs the terraces have been formed in the long
course of persistent ploughing by always throwing the
sod downhill, the turf balk between the strips, always
religiously preserved, preventing the passing of the
sod over to the next strip.   The result of continued
ploughing in this way of each separate strip gradually
each year takes away a sod from the higher side of the
strip and piles it up on the lower side, thus eventually
making a level terrace.   At the same time a steep bank
of turf is formed between the strips, and the hillside
becomes a series of terraces with turf banks between
them.   That this process was perfectly understood by
the Romans is shown by the law which assigns the
ownership of the lower turf bank to the owner of the
strip above because it is necessary to its support, and
therefore must not be encroached upon by the holder
of the strip below it.[1]

There is also a considerable German literature upon
the high-backed lands known as the Bavarian *Hochäcker*,
which from their length of furrow seem to point to large
teams of oxen, and which are generally referred to
Roman or pre-Roman times.   But we must not be
tempted to enter upon ground so debateable.   It is

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[1] Lachmann and Rudorff, *Schrif-*
ten   der   Römischen   Feldmesser. | Siculus Flaccus, p. 143.   Frontinus,
p. 42.

only necessary to point out that the value of this further Bavarian evidence in both its locality and in its undoubtedly early date consists for our purpose in the proof it gives of the early and wide extension of the method of forming what we know in England and Brittany as ' *high-backed lands.*'

These high-backed acres are found in North Germany, but they were prevalent in Bavaria probably in pre-Roman times. Resemblances in traditional methods of ploughing, in the size of the plough-teams and the form of the acres ploughed by them in distant regions and distant centuries are evidence of the continuity in the making of custom over long periods and widely-extended areas. And so in this case, whether we seek the origin of the high-backed lands or of the larger plough-team, we need not go for it to the German *Völkerwanderung.* We find plough-teams of 6 and 8 oxen in the Vedas—in Asia as well as in Europe.[1]

And if we follow the pages of Siculus Flaccus and connect what he says of the terraces and linches (superciliæ) with the description he proceeds to give, obviously from personal observation, of the non-Roman open field system with its holdings of scattered strips, we shall not be open to the charge of imputing the origin of the system either to the Romans or, as though it was the only other alternative, to the German conquerors of Roman ground.

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[1] Zimmer's *Altindischer Leben,* p. 237. Berlin, 1879.

PART IV.

THE CUSTOMARY ACRES OF NORTHERN AND EASTERN EUROPE.

CHAPTER I.

THE STUNDE OR PARASANG OF NORTHERN AND EASTERN EUROPE.

It will be convenient in commencing this chapter to consider how far the facts regarding the sporadic occurrence of one and another of the associated customary acres along the line of the prevalence of the leuga have advanced our inquiry.

One prominent feature shown by the map is that these 1×10 acres common to Britain and Gaul seem to congregate together in the Départements on what we may speak of as the Armorican shore whilst shading off and occurring only sporadically towards the East and South, where the acres in a square more and more become the predominating type. The *stade acre* [1] is the only one of which this cannot be said, and it is the one most directly connected with the itinerary measure, the leuga.

Again, whilst the open field system of husbandry was widely prevalent in Germany and involved in corn cultivation strips with long furrows, we have found it

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[1] With furrow 185 m.

difficult to find evidence of more than a sporadic presence in Germany of the particular acres in question or even others of the 1 × 10 form further North than the Romanised district of which Trèves and Mainz, and Frankfort-on-the-Main, and Fulda were the natural centre.

It has already been explained that had we at command the same details for Germany and the Slavic regions as the Official Tables supply for the various Départements of France, more German acres of the 1 × 10 type might have been disclosed. And in fairness I wish once more to emphasise the point that the geographical range of the particular 1 × 10 acres of the group common to Britain and the corn-growing districts of France must not for a moment be taken as limiting the range of the open field system in Germany, or the prevalence of strips or acres with long furrows involved in its methods. Meitzen in his great work on ' Siedelung und Agrarwesen ' has given examples of the open field village system in North Germany, and also in Denmark and Sweden, as well as in Slavic districts, besides those of Middle and Southern Germany.

Our inquiry has been confined to a *peculiar group*, and, so far, all that can be said is that regarded *as a group* it seems to have prevailed only in the British and Armorican Celtic region. We have found in Germany individual wanderers from the group, but even these seem to find a home rather in old Celtic than in North German lands.

The peculiar character of the British and Armorican acres lies in the close connection they disclose between agricultural methods on both sides of the Channel, and in their close association with the great itinerary measure

the *leuga* or the *diagonal of its square,* the ancient prevalence of which in Britain as in Gaul we have seen good cause to recognise.

So far, then, as the connection with the leuga is concerned, the facts regarding the group of 1×10 acres might be left to speak for themselves.

But it would be unfair to the German side of the question if due consideration were not given to the rival itinerary measure—the Stunde or parasang—with which the German and other agricultural units north of the Carpathians in their turn are most closely connected. And to this rival parasang and the agricultural units connected with it attention must now be turned.

The two great itinerary measures are not wholly unconnected. The point of connection is the *stade.* There is a fact relating to the stade which seems to afford the key to the divergence between them and at the same time to show that in origin they were not far apart.

The Romans divided the stade common to both into 625 artificial feet of their own standard of ·296 m.

The Greeks divided the same stade into 600 of an artificial Greek foot of ·308 m., which the metrologists designate as the *Attic* foot. Both Roman and Attic feet were thus equally artificial feet. From the point of view of natural measures to which we have adhered throughout, the stade was 750 natural feet of ·247–·252 m., and within similar limits of variation the Attic foot of $\frac{1}{600}$ of the stade would vary from ·308 to ·315 m.

Within the same limits the stade itself would vary between 185 and 189 m.

Now, the simple fact seems to be that in the region north of the Carpathians and outside the region of the 1 × 10 acres the leuga and milltyr apparently disappear and give place to a rival itinerary measure, viz. a *Stunde,* or hour's journey—a parasang—but mostly called a *' mile,'* based mainly upon the higher standard of the artificial foot of ·315 m. and following its variations. It consisted of 30,000 natural feet, *i.e.* 5000 natural paces of 2 steps of 3 feet, but it was everywhere known as 24,000 of these artificial feet.   The limits of its variation should therefore naturally be between 7392 m. (foot of ·308) and 7560 m. (foot of ·315) ; and we shall find that it sometimes reached an excessive limit of 7584 m., when the artificial foot adopted was ·316 m.

In following the old customary itinerary measures of North-East Europe as given by Martini and others we repeat that it must not be forgotten that they may have been disturbed by influences across the Carpathians into the Danube Valley, or the reverse, not only owing to the movement of German tribes southward, but also later on following the backward and forward tides of Gothic, Slavic, and German conquest and settlements. And further, besides the cross-currents between the Celtic and Slavic and German occupants of the debateable ground in the valleys of the Danube and the Rhine, more modern political dislocations must also be reckoned with, behind which our information may not always go.   Nevertheless the results as we have them are sufficiently striking.

The customary measures of the several districts are reported in the books to have been (before modern alterations) as follows :—

The *Upper Danubian* district (Vienna).

 Foot .   .   . ·316 m.
 Ruthe   .   . 3·793 m. (12 feet).
 Meile   .   . 7586 m. (24,000 feet of ·316 = 40 stades of 189);

The *Rhenish* district (Amsterdam).

 Foot .   .   . ·314 m.
 Pertica   .   . 3·77 m. (12 feet).
 Meile .   .   . 7532 m. (24,000 feet = 40 stades of 188).

The *Danish* district (Copenhagen).

 Fod .   .   . ·314 m.
 Ruthe   .   . 3·14 m
 Kabellangde   . 188 m.
 Miil .   .   . 7532 m. (same as Rhenish).

The *Norwegian* district.

 Fod .   .   . ·314 m.
 Rode   .   . 3·14 m.
 Miil of Norway . 11,295 m. (36,000 fod = 60 stades of 188).

The *Schwerin* district and *Prussia*.

 Foot of Rhine
  anciently used
  for land-mea-
  suring .   . ·314 m.
 Prussian mile   . 7532 m. (24,000 feet = 40 stades of 188).

From these figures it will be seen at once over how wide a region of North-Western Europe the rival parasang of 7400–7560 m. extended, how rigidly it adhered to the higher standard, and how consistently it was throughout based upon the so-called Attic foot of ·308–·315 m.

CHAPTER II.

BEFORE passing from this Northern European rival parasang of 24,000 artificial feet of normally ·308–·315 m., *i.e.* of 40 stades of 185–189 m. another itinerary measure must be noticed.

In the Slavonic district between the Black Sea and the Baltic the prevalent itinerary unit of the *werst* has to be reckoned with.
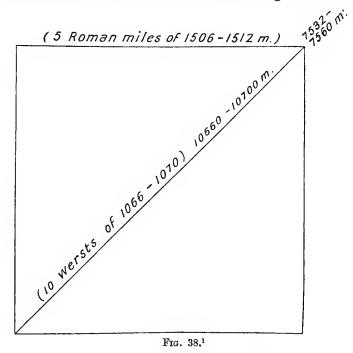
What is the werst ?

The answer seems to be that it is $\frac{1}{10}$ of the diagonal of the parasang of 7532–7560 m., and so one-half the diagonal of the Roman mile of 8 stades, the parasang being taken at its actual higher standard and the Roman mile being raised to agree with it. (Fig. 38.)

Had the lower standard of the foot, viz. 308 m., been adhered to, the parasang would have been 7400 m., 200 short sides of the medimnus and the werst would have been 1048 m., 20 of the sides of the khet.

The rival parasang thus was a multiple of the *Roman mile* of 8 stades instead of the leuga of 12 stades. It was in fact 40 stades or 5 Roman miles, but varying within the variation in standard, so that, instead of the mile being 8 stades of 185 (*i.e.* 1480 m.) at which the Roman mile became fixed, it becomes 8 stades of 189 (*i.e.* 1512). And as we trace its geographical prevalence we shall find that whilst adopting and following the

variations of the artificial foot, the higher standard of
·314–·316 is generally maintained and even sometimes
slightly exceeded.   It also had another important
relation to the Greek medimnus, being 1000 times the
long side of its two squares, but on the higher standard,

FIG. 38.[1]

and this is important as resulting in the spread of the
medimnus over Northern Europe.

There are several points connected with the werst
which arise out of this connection with the Roman
mile, notably the use of the Roman foot, pointing to
Byzantine influence ; but these will be best considered

[1] Leuga is $\frac{3}{10}$ of 7532–7560 and so English statute mile is $\frac{3}{10}$ of half
the diagonal of 7560.   1½ werst (at 1070) = English statute mile which
is $\frac{1}{5}$ of half-diagonal of leuga.

when the agricultural measures of the werst region are examined.

In the meantime besides its distinctive home in Russia its extension to Russian Poland is natural. And according to Martini the Courland mile (Riga) (7467 m.) is reckoned as 7 wersts of 1067 m. which are composed of 1750 Landmesser ells of ·609 m., which, being equal to 2 English feet, may go back no further than Peter the Great, who introduced the English foot into Russia.

The mile of Sweden and Finland is reported as 10,688 m., which may be 10 wersts, but being in itself the diagonal of the parasang it may have been derived directly from it.   But here also Byzantine influence may be suspected as the Swedish measures are based upon the enlarged Roman foot of ·297 m.

When we remember that the itinerary measures of the Danubian great corn-growing plain were based on the diagonal of the *leuga* of lower standard and that the rival parasang was based upon the Attic foot of ·308 enlarged to ·314, and now find the werst to be connected with the enlarged Roman foot of ·297, we seem to suspect traces of a conflict and compromise between Greek and Roman measures which points to Byzantine influence, and forbids reliance on the antiquity of the Hungarian measures which seem to be derived partly from Vienna and partly from the lower Danubian district.   Finally, the absence of evidence as to the measures of the mountain tracts south of the Danube Valley seem to bar us in that direction also.

CHAPTER III.

THE AGRICULTURAL UNITS OF NORTHERN AND EASTERN
EUROPE.

WE have now to consider the connection of these itinerary measures with the agricultural units of the districts in which they were prevalent.

We have seen that the itinerary measures of the great plain of the lower Danube and its tributaries were based upon the diagonal of the leuga, and that through this connection the *faltasce* of Jassy became practically identical in form and area with one of the most important of the group of British and Armorican 1 × 10 acres in its Continental form of 1 × 5.

The area of the faltasce equalled 4 *Greek* medimni or 10 *Greek* modii of corn-land of the *higher* standard. The area of the medimnus was 28·25 ares and that of the modius 11·3 ares, and that of the faltasce 113 ares— all of higher standard.

The *half-acre* of the faltasce therefore contained 2 Greek medimni or 5 modii of the higher standard in the form of 1 × 10, and this area turned into a square would contain 2 medimni in their normal form, each of two squares.

The accompanying map will show over how wide a region this square of two medimni or a similar area in three squares was the prevalent customary unit of agriculture according to the tables of Martini. (Fig. 39.)

In the valley of the Danube, without entering the Bavarian district of the leuga, and well within the district of the 7560 m. parasang the *Joch of Vienna* is a square of 75·84 m. ($\frac{1}{100}$ the parasang) with an area of 57·546 *ares*. It is therefore both in area and form *two medimni of the higher standard*. The foot being ·316 m. accounts for the excess of standard in the Joch and also
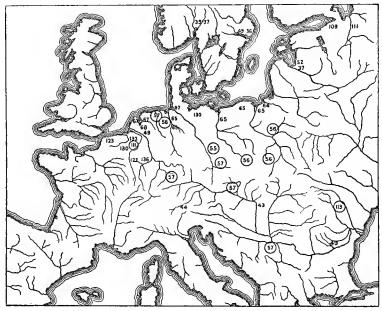
Fig. 39.

in the parasang which here is raised to 7584 m. The Joch is divided into 3 Metzen or Aussaat.

The *Lanatz* or *Joch of Belgrade* is the same in form and area as that of Vienna, but it is divided into 8 Motika for vines of 7·19 ares in the form of two squares.

In *Wurtemberg* and *Old Prussia* the form of a square is still preserved ; 400 square rods of 12 feet, but

with the slightly smaller foot ·314 m., making the area of the square 56·738 ares, *i.e.* 2 *medimni of* 28·37 or 5 modii of 11·35 ares.

In *Buda-Pesth* naturally the Joch of Vienna is prevalent, but there is also a local Joch composed of 6 of the Belgrade Motica and so $\frac{3}{4}$ of the area of the Joch of Vienna in use especially for vines.

In *Bohemia* the unit at Prague is the *Strich Aussaat* of 28·73 ares, *i.e.* almost exactly half the Vienna Joch, but it is in *three squares*. This is *one medimnus* of the

3 *Constantinople donum.*
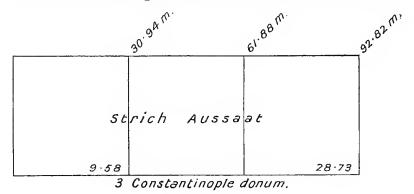
Fig. 40.

same standard as the others, but being in three squares it forms a connecting link with the next district.

Moreover, the Bohemian *Stunde* or parasang is stated to be 4630 m., *i.e.* 50 lengths of the Gewendt of 92·32 m. being half the diagonal of the square of the milltyr of the higher standard of 6558 m. So that here there seems to be a recurrence to the other itinerary measure. And in this conflict of itinerary measures apparently lies the reason why the Bohemian Strich Aussaat is in three squares instead of two.

With the recurrence of 3 squares we seem to pass

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into another range of customary measures but without losing the presence of the medimnus.

In *Saxony* (Dresden) before 1858 the customary ' *Acker* ' was composed of two morgen each a medimnus, whilst the Acker itself was in the form of 3 squares.

FIG. 41.

In *Silesia* (Breslau) the form of the unit is also in three squares, each of 100 square pretow of 4·32, making the area 55·97 ares.

And in *Poland* (Warsaw) the *morg* is again in three squares, each of them being a *sznur* of 100 square pretow of 4·32 m., making the area the same 55·98 ares.

These three districts therefore present a land unit in three squares of 2 medimni or 5 modii, the medimnus 27·67, 27·98, and 27·99 ares, and the modius 11·07, 11·19, and 11·19 respectively.

There remains belonging to this district the morg of *Cracow*, as reported before 1837. It consisted again of 3 squares, each of 100 square *pretow* or perticæ of 5·346 m. Each of the 3 squares is 28·5 in area, being one medimnus like that of the Bohemian Strich Aussaat. Two of the squares equal in area the Vienna Joch of 57 ares and the three together make the morg of 3 medimni 85·5

in area, *i.e.* nearly equal to two of the Hungarian Joch of 43·159.[1] There is also a greater land unit reported—the *wloka* of 30 morgow or 2565 ares.

Nearly connected geographically with the before-mentioned district must be added that of the *Russian dessiatina.* It contained, like the faltasce, but of lower standard, 4 Greek medimni of 27·25 ares, or, as its name suggests, 10 Greek corn-land modii of 10·9 m., its area being 109 ares against the 113 of the faltasce. It was built up of six squares each of (20 × 20) 400 square *sachines* of 2·1336 m., *i.e.* with a side of 42·7 m. which is the 'schoinion of land-surveying' of Oxyrhynchus Papyri (IV. p. 118).

Allowing for slight variation of standard it equalled in area $\frac{1}{100}$ of the square werst. But both as regards werst and dessiatina it is supposed that until altered by Peter the Great they were anciently of somewhat higher standard.

That in all this may be traced Byzantine influence may perhaps be suggested by the fact that each of the six squares of the dessiatina contained in area two of the *donum*, the customary agricultural unit of Constantinople.

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[1] The *wloka* of 30 morgow = 2565 ares = 90 medimni or 100 Roman jugera.

CHAPTER IV.

NORTH of the districts hitherto considered with their agricultural unit of 2 *medimni* or 5 *modii* of corn-land of *higher* standard lies the Baltic district with a different set of agricultural measures.

The peculiarity of this district is a departure from the medimnus. The prevalent unit is one of 6 *modii* of *lower* standard with an area of 65 ares and also its double of 12 modii, *i.e.* of 130 ares.

The map (p. 174) will show its geographical extent reached along the Baltic Coast from Hanover eastwards, embracing Mecklenburg, Schwerin, and Pomerania.

The absence of the medimnus is the peculiar feature of this region.

Beginning with Hanover the *Juck* or *arpent* of *Kalenberg* consists of 3 squares each of 100 square Ruthen of 4·67 m. Each of its three squares contains 2 modii of 10·92 ares and its whole area includes 6 modii or 65·525 ares. (Fig. 42.)

The *Morgen* of *Pomerania* and *Stettin* is almost identical. The *Konigsberg Morgen* is also of three squares of 100 square Ruthen of 4·62 m., so giving to the Morgen an area of 63·906 ares (6 modii of 10·65).

In *Schwerin* the *Last Aussaat* is composed of 6 squares of 46·5 m. to the side and contains an

area of 130 ares, *i.e.* 12 modii of 10·9. It is thus double the area of the *Kalenberg* Juck.
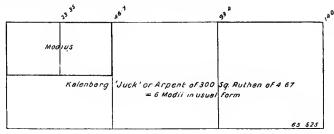
FIG. 42.

Here then the influence of the modius of corn-land is as marked as ever, but it is of the lower standard. The three squares in each case contain 6 modii, and the Schwerin Aussaat of 6 squares contains 12 modii, all of the lower standard.
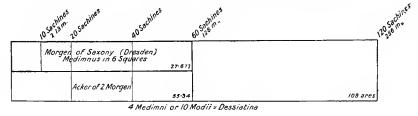
The first suggestion might be that from connection with the modius this district must be classed with the others, but the remarkable and decided change in standard as well as the disappearance of the medimnus forbid us to come to a hasty conclusion.

The real connection of the Baltic agricultural area seems more likely to have been with the *dessiatina* which, as we have seen, is (unless altered by Peter the Great) of lower standard, like these Baltic acres.

These Baltic acres of 6 modii are *in area* almost identical with the Northumbrian or Irish acre, but there is no resemblance in shape—no approach to the 1×10 form. It is true that the six squares of 42·7 m., of which the dessiatina is composed if set in a row would be 256 m. long, *i.e.* the furrow of the Northumbrian and Irish acre. And the same may be said of the customary 'Acker' of Saxony: if the two 'Morgens' or

' Scheffel Landes ' were put end to end they would
make the same length of furrow.

We have, then, here in the square of the furrow of
256 m. the connecting link of these Baltic, Saxon, and
Russian agricultural measures with the Northumbrian
and Irish acre.   The square of that furrow would
contain 10 Baltic acres in area but not in form.   It
would contain 6 dessiatina, 24 of the Saxon (Dresden)
Morgen, and all very fairly of the same lower standard.

4 Medimni or 10 Modii = Dessiatina

Fɪɢ. 43.

The real meaning of the difference in form between
the Dresden and the Baltic acres is clearly that the
Baltic acres of the Kalenberg type are based on the
modius (they are 6 modii of its usual shape in 2 squares),
whilst the Saxon and Russian units wander from the
modius in form (like the donum of Constantinople) but
are nevertheless multiples of its area.   And further,
both the Saxon and Russian units retain in view both
the medimnus and the modius.   They take care to be
multiples of both, whereas the Baltic acres seem to keep
the modius only in view.

If we ask as regards the Baltic acres whether the
Baltic and British acres of 65 ares or 6 modii of lower
standard are to be considered as having had direct
connection passing from one shore to the other, tempting
as it might be to attribute the presence of this acre in

Northumbria to the Danish or Norse conquest and the Northumbrian kingdom of Halfdan, the difference in form, if nothing else, would stand in the way of the hypothesis of importation from the Baltic ; and why, too, should acres of this area, but in 1×10 form, be found in Cumbria and Ireland, Cornwall and South Wales ? Again, seeing that the British acre with furrow of ·328 m. is of the same area as the Russian dessiatina, the theory of importation would prove too much. Both medimnus and modius may have travelled independently by different routes. Nay, the proof seems ready that they did.

We are left then to regard the great corn-growing district of the Black Sea as the common centre from which both modius and medimnus spread by different routes. And the Baltic region, being in such close contact with Byzantine influence, would be so much more likely to derive its agricultural measures from this source rather than from across St. George's Channel that a derivation from British or Irish influence seems to be out of the question.

CHAPTER V.

THE ACRES OF THE LOW COUNTRIES.

We have yet to consider the acres of the Low Countries.

Naturally the first point is to find the limit of the Kalenberg or Baltic acres.

It will be seen from the map that the *Weser* seems to be the line between the lower standard of the Baltic and the higher standard of the Rhenish (?) route.

Between the Weser and the Ems there are three acres reported in the books. All of them are evidently of 5 *modii* or 2 *medimni* of higher standard, a square of 56·7 ares, an acre in 3 squares of 57·92, and one of 1 × 10, the ancient Oldenburg acre of 56 ares.

Beyond the Ems there is the *diematt* of 98·21 ares in 2 squares. In Groningen and Drenthe the same acre appears, and its half in three squares. Then there are 3 acres, the scheffelgezaar of 33·32 in 2 squares, the veenmatt of 66·65 in 3 squares, and a third of 133 in 8 squares—these are like the Baltic of 3, 6, and 12 modii, but of the higher standard.

Across the Zuider-Zee the *maat* is 67·56 in 6 squares.

If only they had been of the lower standard all these would have clearly belonged to the Baltic acres.

In Overyssel there is a double tagmatt in two squares 58·43 and another acre in 6 squares 123.
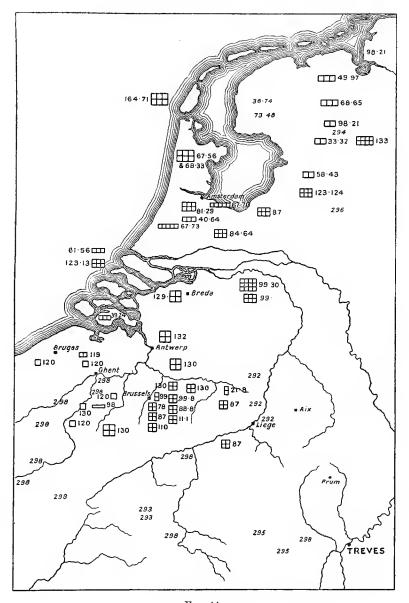
Fig. 44.

The acres of *Amsterdam* are given as follows :—

Morgen del Reno, 85·156 ares in 6 squares (600 square roede del Reno of 3·77 m.).

Morgen of Amsterdam, 81·286 in 6 squares (600 square roede of Amsterdam of 3·68 m.).

Juchart of 40·64, half the morgen (300 square roede of Amsterdam of 3·68 m.).

Maat of 67·74 of 500 square roede of Amsterdam. This is the acre of 6 modii of higher standard.

All these acres are of higher standard. And it is curious to find among them as the special morgen and juchart of Amsterdam in the 81·286 and 40·64, so far as area is concerned, the Normandy and the English statute acre in 6 squares and 3 squares respectively, they, too, being of higher standard.

In *North Brabant* two acres appear of 99·30 in 12 squares and 99 in 6 squares. These are double dag-maats of Friesland, and lastly there is in Guelderland an acre of 87 in 6 squares, the double of which occurs also in the island of Texel, 164·71 in 6 squares. These two are evidently 8 and 16 modii of lower standard.

We have now exhausted Holland, but following up the Meuse in Limburg and Liège the acre of 87 ares in 4 squares and its quarter appears again.

In East and West Flanders at Ghent there is the bonnier of 121 ares and at Bruges of 120.

In Antwerp and South Brabant there is a mixture of bonniers, all of them of so many modii, but sometimes of the higher and sometimes of the lower standard. In Antwerp there are two bonniers each of 4 squares of 130 and 132 ares, *i.e.* 12 modii ; in South Brabant, to the north, two similar bonniers of 130 ; a little further south, bonniers of 99 ares (9 modii), 88·8 (8 modii), 87 (8 of lower standard), 78 (7 of higher standard), and

110 (10 modii of lower standard). In Hainault the bonnier of 130 appears again.

In three cases in Flanders where the bonniers are mostly multiples of the *vorsus*, being 27·6 m. square, there appears at Alost a 1 × 10 acre with furrow of 329–330 m., 6 × 60 of a rod of 5·52 and with an area of 109 ares and also a bonnier or leenmaete of two Cornish acres side by side, each of 4 × 40 rods of 5·54 and an area of 98·96, *i.e.* slightly higher standard.

On the south-east of the Meuse we reach a district which *has an acre* 1 × 10 *of St. Lambert*, a stade acre of 189 m., and which belongs to the hilly country of which *Trèves* seems to be the centre.

We have found little in the acres of the Low Countries to enlighten us other than the almost constant fact that they are multiples of the modius.

The almost entire absence of 1 × 10 acres leads to the suggestion that the few which do appear are wanderers either from the Rhine or from Oldenburg.

And thus, imperfect as the general evidence of the customary acres of these districts avowedly must be for more ancient conditions, I think it will point to the conclusion that there is nothing to suggest that here can have been the home of the 1 × 10 acres from which they were imported into Armorica and Britain.

CHAPTER VI.

THE EASTERN ORIGIN OF THE EUROPEAN PARASANGS.

THE recognition of the importance of the rival European itinerary measures, both traced back to the Græco-Roman stade divided into 600 artificial feet of 308–314 m., makes it all the more necessary, if possible, to ascertain the meaning of these itinerary measures before we can fully understand their relation to the agricultural units developed from them.

It has to be recognised that the tribal life of an already settled but still pastoral people as we find it in Ireland and Wales must have been preceded by a period of unsettlement and migration.

Traces of survival from an earlier nomad life may perhaps be found in the necessity in the pastoral stage for the tribesmen to move with their cattle from summer to winter quarters, and in the general fact that during this stage the tribesmen are still the moveable element, easily shifted about from one district to another, carrying with them, as under Welsh custom, the fire-back stones of the family hearth and the rights of the tribal group to which they belong without any unnecessary disturbance.[1]

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[1] I am indebted to Professor Liebermann for the suggestion that the fact that in early legal definitions the *house* is classed among *moveables* there may be a trace of nomad or semi-nomad conditions.

The nomad life may, too, have had its part in the fixing of itinerary measures.

The day-journey was a marked point in earlier Eastern tribal life, in which nomad tribesmen of the Asiatic steppes had to pass twice a year over sometimes many day-journeys between summer and winter pastures. Following the traditional track with all their belongings, their household waggons and their cattle, the night's encampment was the natural mark of distance and travel, and left its trace behind it in the tribal habit of counting time by *nights*. The night's encampment was the *rest*, the stationary place where year after year on the traditional route the cavalcade caroused around the nightly fire.

No doubt a tribal order was pursued on this journey. The Israelites were arranged and ordered in tribes and families, not only in the camp but on the march. The portable tabernacle was the centre of the march as well as of the resting-place. It contained the sacred fire of the travelling tribe leading by its pillar of smoke by day and of fire by night. Each tribe or family had its fixed place both on the march and in the camp, but the nightly encampment was naturally the prominent goal of the day's travel.

Long after the nomadic stage was passed and the tribes were limited in the range of movement by neighbouring tribes, the chieftain and his retinue moved from place to place among his tribesmen, claiming the *night's entertainment*, which thus naturally became the unit of tribute and service to the chieftain, as it is found in practice under tribal methods, and continued under later manorial custom.

So, too, the caravan routes for trade and traffic and

the bringing of the tribute from conquered or dependent
tribes to the Royal centre would become naturally
marked by the *stations* at which each night was
spent.

With the establishment of empires based upon tribute
from conquered countries, and involving extended
sovereignty over tributary tribes, would come the
necessity for ordered arrangement of carrying services,
and at length something like Governmental postal
service, stations of post-boys and post-horses at points
on the track or the road by which the day-journey itself
was divided into rests or stages. Some such stages
must have preceded the final settlement of customary
itinerary measures.

An orderly postal service had probably long ago
existed and was further extended and organised rather
than created throughout the Persian Empire by Cyrus
the Great in the sixth century B.C., and Herodotus
described what he saw and knew as an old institution
which had been long at work in his time.

Aristagoras had told the Athenians that the journey
for an army across Asia Minor to the palace of the
Persian monarch would take 90 days ; whereupon
Herodotus gives what he calls the ' true account ' of
the great road from Sardis to Susa.   He describes it as
having Royal stations fixed along its whole length
and excellent caravanseries.

He gives the name of each station and the distances
between the stations in ' parasangs.' He treats these
stations as the actual resting-places at which the
Athenian army would have stayed night after night.
Of course the stages were not all alike, and unfortunately
in some cases the figures are imperfect. But the

distances between the eighty-one stations on the route which are given average almost exactly 4 parasangs.

Further, in making up his total in order to compare it with the statement of Aristagoras, he reckoned the day-journey at 150 stades, which at 30 stades to the parasang would make 5 parasangs instead of 4 between the stations.

In another place (V. 53) he reckons the day-journey again as 150 stades or 5 parasangs of 30 stades, but in yet another passage (IV. 101) he reckons the day-journey at 200 stades, which would be 5 parasangs of 40 stades, which is quite in accordance with his general statement that the parasang was sometimes of 30 and sometimes of 40 stades. The parasang was the hour's journey which naturally covered more or less distance according to the nature of the country. There were therefore parasangs and parasangs, and the day's journey might either consist of smaller or larger numbers of similar parasangs, or be divided into smaller or larger parasangs.

The day-journeys of the Greek army through Asia Minor described by Xenophon average about $4\frac{1}{2}$ parasangs, but the actual stades are evidently small ones, being probably actual stades of an army's march. The stadium of the foot-race and that of the military march may well have been different things.

We have thus in Herodotus and Xenophon the division of the day-journey into 4, $4\frac{1}{2}$, and 5 parasangs.

We come still nearer to our purpose when we find that the measures of the 'Avesta' are based directly on natural measures, like those of Wales and Ireland.

Beginning, like Dunwal's, with the natural foot, 3 feet made a step.[1] The usual itinerary measures

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[1] *Avesta,* 'Vendidad,' IX. 15–20.

seem to be the hathra or hasar and the parasang. And on the evidence of the Bundahis (XXVI. 1) 'a hasar on the ground is a parasang of 1000 *steps of the two feet*,' and of Bundahis (XVI. 7) the length of the hasar was $\frac{1}{4}$ of the parasang.

Then from the Farhang-i Oîm-khadûk the further point is gained that there were different hathras.

A medium hasar on the ground which they call a parasang is 1000 steps of the two feet when walking with propriety ('Sacred Books of the East,' V. 98, note to Bundahis, XXVI.).

Here we have a hasar or hathra of 1000 *double* steps. Another hasar is mentioned in which 3 steps count as a pace.[1] This hathra is therefore 1000 *triple* steps or $1\frac{1}{2}$ the hathra of the double step.

These authorities lead us to expect various hathras of various parasangs, but all of them are multiples of a unit of 1000 natural paces of 3 natural feet.

We are thus enabled to add what within the limits of variation in the natural foot would be the actual length in metres of the several multiples of the hathra. Starting from the natural step of 3 natural feet of ·246–·251 m. the single step would be ·740 to ·753 m.[2] And from this natural single step all the rest follows as in the table on p. 191, if we adhere to multiples of the hathra of 1000 steps.

It is impossible, I think, after this verification of the nature and standard of the Eastern parasangs and hathras, so far as founded upon natural measures, to doubt the Eastern and early origin of European itinerary measures.

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[1] *Bib. Orientale*, V. *Sub* 'Avesta,' in which this fragment is given at p. 616.

[2] *I.e.* half the Roman pace of

5 Roman feet—·296 × 5 = 1·480, 1000 of which made the Roman millepassuum.

Nat. feet of 246·252.	No. of steps of 3 feet.	No. of Stades.	Length in Metres.	
6000	1000 *double* steps	8	1480–1512	= Roman and Greek ' *millepassuum.*'
9000	1000 *triple* steps	12	2220–2268	= Gallic *leuga.*
12000	2000 double	16	2960–3024	= Two Roman miles.
18000	2000 triple or 3000 double	24	4440–4536	= German Rasta of two leugæ or 3 Roman miles.
24000	4000 double	32	5920–6048	= 4 Roman miles.
27000	3000 triple	36	6660–6804	= Welsh milltyr.
30000	5000 double	40	7400–7560	= 5 Roman miles or Rhenish mile, *i.e.* parasang of N.W. Europe.
36000	4000 triple	48	8880–9072	= 2 Rastas or 4 leugæ, parasang of the Byzantine ' short-tailed ' service.

But it would seem that Herodotus approached the parasangs from the point of view of the so-called Attic foot ·308–·314 m., into which the stade was divided, rather than the natural foot.

After stating the width of Egypt in *stades* and *schoinoi*, in describing the pyramids of Lake Mœris,[1] instead of counting in natural feet he begins with an artificial foot of 4 palms, a cubit of 6 palms, and an orgyia of 6 such feet or 4 such cubits, 100 orgyia making his stade of 600 feet.

Reasoning backwards from the stade the 600 feet can hardly be other than Attic feet of ·308–·314 m. This is shown most clearly perhaps by the fact that an orgyia of 6 feet of 4 natural palms would at the lowest

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1 Herod. II. 149.

standard of 1·97 m. be greater than the outstretched arms of a middle-sized man could possibly reach.

When Herodotus speaks of schoinoi of 60 stades, as he does in this passage, we may at any rate suspect that he is using the foot of ·308–·314 which was the basis of the North European *Stunde* or parasang, and that therefore his parasang of 30 stades would equal 5544–5640 m., and that of 40 stades 7392 (say 7400)– 7520 m.   This parasang of 40 stades would thus translate into 30,000 natural feet, 5000 natural paces, *i.e.* 5 hathras of 1000 steps.

We thus arrive at what seems to be a fair inference that whilst Herodotus had in mind the artificial Attic 4-palm foot of ·308–·314 and described them accordingly, the Eastern hathras and parasangs from which European itinerary measures were ultimately derived were more likely to have been built upon natural measures.   And this is confirmed by the general view of metrologists who consider the artificial Babylonian foot of 4 palms to have been about ·330 to ·335 m., *i.e.* based upon natural measures.

Before we finally pass from Herodotus there remains for consideration what may have been the meaning of his parasang of 30 stades. It can hardly be a mere coincidence that 5544 m. so nearly equals 200 of the sides of the remarkable ancient Italian land measure 27·5 m. square described by Hyginus and known to the Roman Agrimensores as the ' versus ' or ' vorsus.' We meet it again as one of the two squares of the ' wet-land modius,' and it will become a prominent unit when we come to consider the spread of the measures of the countries surrounding the Mediterranean basin and the colonies founded along its shores, in the next chapter.

PART V.

THE LAND UNITS OF THE MEDITERRANEAN BASIN.

CHAPTER I.

HOMERIC PLOUGHING.

In now returning from the imperfect but still instructive consideration of the two rival parasangs which seem to divide the customary acres of Northern and Eastern Europe so distinctly from those connected with the leuga, we have still to examine the land units of the coast lands of the Mediterranean basin.

Whilst the region of the two parasangs seem to be so distinct, emphasis must still be laid upon the common element forming the basis of both. The great corn-growing Danubian district round the Euxine forms a common geographical starting-point. The corn grown and exported thence to Athens and other Greek cities was measured and reckoned in Greek medimni, and throughout a great part of North-Eastern Europe the land units are multiples of the medimnus as a land measure.

We become all the more conscious therefore that whatever peculiar features may be met with in the

coast lands of the Mediterranean basin, there will
naturally lie below them an already formed substratum
of agricultural custom common to the races occupying
them all.   And, from what has been learned of the
Eastern parasangs, we shall expect to find that after all
it was upon the surface, so to speak, of the common
substratum that particular colonisations may more or
less clearly have sometimes left their marks.

The first step to an understanding of these land units
seems therefore to be to realise how entangled, so to
speak, were the Assyrian, Phœnician, Egyptian, and
Greek land units forming the substratum, and to mark
how they seem to be drawn and kept together by the
adherence to the itinerary measures—the stade and the
leuga—or the diagonals of their squares.   And further
we shall find it well to keep in mind the distinction
between the two pairs of land units : (1) the Egyptian
khet, changing in the two squares of half its diagonal
into the medimnus, and (2) the Greek aroura, changing
in the two squares of half its diagonal into the Roman
jugerum.   The same also may be said of the ' corn-land '
modius, in its two squares, and the ' poor land ' modius
of two *vorsus*.

It would, of course, be tempting to begin the examina-
tion of the land measures of the Mediterranean basin
and of its coast lands by seeking first whether any light
could be gained from Homeric sources.

Professor Ridgeway has indeed called attention to the
shape of the Homeric *gues* or day-work of ploughing.
He no doubt rightly considers the *plethron* to have been
(like the Roman actus) the length of the furrow of
ploughing of a yoke of oxen at one breath, and the
diaulos as including the return travel of the plough.

He points out that in allusion to the ' mighty gift of 50 guai ' of Iliad ix. 579, the scholiast describes the *gues* as a measure of land a little less than 10 orgyiæ, but also identifies it with the *plethron*.[1]

The scholiast to Odyssey vii. 113 (Hultsch, ' Metr.' p. 41), on the ' tetraguos ' of the garden of Alcinous, remarks that ' the *gues* has two stades.'

Combining the statements of the two scholiasts, it is suggested by Professor Ridgeway that the *gues* was a little less than 10 orgyia, *i.e.* 60 feet in breadth and a stade of 600 feet in length.

Lastly, that this was the Homeric day-work of ploughing may be inferred, he thinks, from Odyssey xviii. 370. Odysseus and Eurymachus are supposed to be ploughing all day, fasting till eventide, while the ordinary day-work of the oxen ended at midday. They would thus each plough two ordinary day-works of the field, which was to be a *tetraguon* like the garden of Alcinous.

There seem at first sight to be difficulties in the way of this valuable and interesting suggestion.

The double day-work in this trial of strength was to be accomplished by a single yoke of oxen, both well filled with fodder, of equal age and force to bear the yoke and of strength untiring. And it should be a field of four guai and the clod should yield before the ploughshare. And the ploughman was to cut a clean unbroken furrow.

Now I think no other than the single yoke—no larger team of oxen—is mentioned anywhere in Homer.

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1 Sch. AD. E.M. 242. 23 : πεντήκοντα πλέθρων. οἱ δὲ π. ζευγῶν.— Sch. ed. Bachm. ; γύης μέτρον γῆς μικρῷ τῶν δέκα ὀργυιῶν ἔλασσον. ἢ ζυγὸν, ἢ πλέθρον, ἢ ἑκατὸν ποδῶν. παρ᾽ ἑτέροις δὲ ἑξήκοντα πηχῶν.—Hes. π. πέλεθρον.

In Iliad xiii. 706 : ' In fallow land two wine-dark oxen, with equal heart, strain at the shapen plough, and round the roots of their horns springeth up abundant sweat, and naught sunders them but the polished yoke as they labour through the furrow till the end of the furrow brings them up.'

And on the shield of Achilles many ploughers are pictured at work ; but they seem to have driven their *single yokes*, ploughing in strict order of rotation, following one another as in the case of Elisha, who was ' ploughing with twelve yokes of oxen, and *he with the twelfth.*' In no other way can Homer's wonderful picture of the ploughing be fully realised as true to life. (Iliad xviii. 541–548.)

Furthermore he set in the shield a soft fresh-ploughed field, rich tilth and wide, the third time ploughed : and many ploughers therein drave their yokes to and fro as they wheeled about. Whensoever they came to the boundary of the field and turned, there would a man come to each and give into his hands a goblet of sweet wine, while others would be turning back along the furrows fain to reach the boundary of the deep tilth. And the field grew black behind.

Instead of the larger team, each single ploughman with his yoke ploughed his own single furrow to be followed in close succession by the next ploughman, else the field would not have grown black behind the ploughers, and each *single* ploughman received his goblet of sweet wine before he wheeled about his yoke to the other side of the field, to commence the return journey of the plough. He had accomplished his *plethron* and turned to complete his *diaulos*.

Now the doubt arises whether the single yoke could plough a long unbroken furrow of a stade of 600 feet in length, when the Roman agrimensores considered 120 feet as long enough for the single yoke.

Even if we make allowance for its being a ' third time ploughing,' so that ' the clod should yield before the ploughshare,' the emphasis laid on the ' clean

unbroken furrow ' seems to forbid a rest before the end
of the stade would be reached.   But if, taking advantage
of the scholiast's remark, 'the gues has *two stades,*'
we turn the gues or stade into the form of two ½ stades,
each 1 × 10, without altering its area, as we find so
often done elsewhere, the day-work of the plough becomes
more possible.   The longer furrow of the sweating yoke
is lessened, but still a long one for the single yoke,
while the area ploughed in the day seems still too large.

Is all this conjecture ?

Here let us leave the Homeric evidence and turn
to that of a remarkable fragment which seems to belong
to a district and period when Phœnician or other
Eastern measures had not become wholly merged in the
Egyptian or the Greek.

The περὶ μέτρων γῆς is given at length by Hultsch
('Met. Script.' i. 56), though he confesses that he is
unable to understand its measures.   It contains, how-
ever, information which may influence our view of the
Homeric evidence whilst, *inter alia,* throwing some
interesting light upon the day-work of the plough and
the Homeric problem involved.   There may be after all
the possibility of a long furrow for the single yoke in
an already well-ploughed plain of alluvial soil, notwith-
standing the Roman tradition that 120 feet was long
enough for the single yoke.

The measures of this fragment up to a certain point
seem to be Greek.

Cubit	= 24 fingers	. . . . .	= ·498–·504 m.[1]
Palm	= 4 ,,	. . . . .	= ·082–·084 m.
Span	= 12 ,,	(3 palms, *i.e.* natural foot)	= ·246–·252 m.
Podismus	= 16 ,,	*i.e.* 4 palm foot . .	= ·328–·336 m.
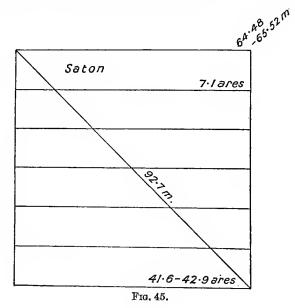
[1] If based on the natural foot.

The natural foot of 3 palms has, it seems, already been supplanted by the artificial 4-palm foot. The natural foot is here called a *span*, as we shall find it elsewhere in the Mediterranean basin, notably in the districts at the mouths both of the Danube and the Rhone, where the natural foot becomes the *pan* in one case and the *palma* in the other. But we seem to pass beyond Greek lines when the *jugon* of 5 arouras is described as containing 30 satias, *i.e.* 6 satias to each aroura.

The aroura, moreover, is not the usual Greek one of 100 cubits square but ' *it is of* 130 *cubits.*' Why of 130 cubits ?

Now 130 Greek cubits of ·496 to ·504 m. would make an aroura of from 64·48 to 65·52 m. to the side. It

FIG. 45.
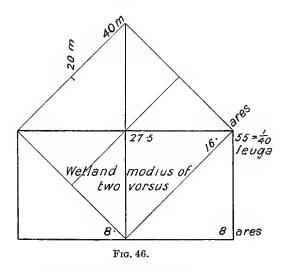
can hardly be an accident that the side of this aroura taken at the higher standard of ·504 m. to the cubit

would be 65·52 m., *i.e.* just half the furrow of the 'stade' acre in the form of 1×5 (131 m.) and its diagonal (92·7) just half the length of the stade of 185 m.

This 'aroura of 130 cubits' is clearly in area intended to be $\frac{1}{8}$ of the square stade of 185 m.

Allowing for variation within the limits of the natural foot, its area would be from 41·6 to 42·9 ares, and that of the *jugon* of 5 such arouras would be 208·0 to 214·5

FIG. 46.

ares. As it contained 30 satias the area of the satia or saton would be 6·93 to 7·15 ares.

The next statement of the fragment is that ' *The yoke of oxen ploughs in a day* $2\frac{1}{2}$ *satibas.*' This would make the day-work 17·32 to 17·87 ares, which brings us again to the stade, for this is the area of *half a stade acre.* So that the day-work of the fragment is just half the Homeric day-work of Professor Ridgeway.

There is a further statement that ' the *plethron* has a length of 26 cubits and in breadth the same,' *i.e.* from

12·9 to 13·1 m. square, being thus $\frac{1}{10}$ of the half stade acre or day-work in the form of 1×10.

The fragment contains one other statement.   Whilst the jugon is said to be of 30 satibas *the kouria (? Cor) is said to be of '13 small jugera.'*

The Phœnician *kor* as a measure of capacity contained 30 sata, so that the kor and the jugon of seed-land should correspond.

The area of the jugon of 5 arouras of 41·6–42·9 ares being 208–214 ares, the 13 ' small jugera ' it contained would be from 16 to 16·5 ares.   This is the *wet-land modius* of *two vorsus* of higher standard.   The long side of the two vorsus on the diagonal of the wet-land modius would be $\frac{1}{40}$ of the leuga.   (Fig. 46.)

Within the limits of natural variation of standard the statements of this interesting fragment thus seem to be consistent with existing measures otherwise known and so far as they go to represent reality.

Besides the Homeric interest in the connection of the day-work of ploughing with the stade, they are useful as showing how Phœnician, Egyptian, and Greek measures were entangled together and gradually blending in a substratum of common custom.   The kor and the saton were not Greek measures but yet they seem according to the fragment to be connected with the stade and the plethron and to seek to establish relations also with the wet-land modius and the vorsus.

The diagram (fig. 47) represents the scheme of measures of the fragment keeping within the limit of difference of standard between 185 m. and 189 m. in the length of the stade and reckoned upon the natural foot.

The division of the aroura of six satibas into 25

plethra of the $\frac{1}{2}$ stade acre (1×10) probably indicates a conflict and reconciliation of measures—but without absolute exactness. Nevertheless the self-contained consistency of the fragment is remarkable.

Lastly, before passing from it, let us note, so to speak, by-points which have been gained. Heretofore we
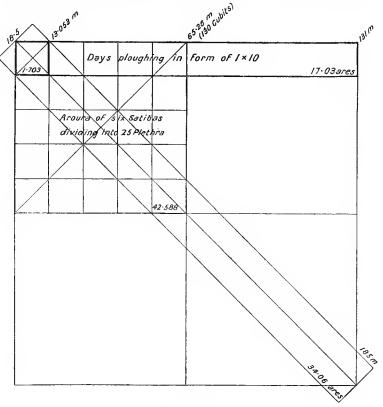
Fig. 47.

have been led to regard the stade as distinctively an itinerary measure. So it became when the length of the furrow in the ploughing was found so often to be a division of the leuga.

The leuga contained 12 stades of 185 m. of the Romano-Greek standard. But we have been led by the Homeric evidence, confirmed by that of the fragment, to regard the stade as originally the length of the furrow in the ploughing, the travel of the plough, rather than as the unit of travel on the road. Another point of interest has arisen, viz. the importance of the day-work of ploughing as a unit of measurement of land. And, further, we have learned that the notion of the Roman agrimensores that a yoke of oxen could not at a breath draw the plough more than 120 feet was a local one, and not to be regarded as belonging to widely extended custom.

Finally, putting together the Homeric evidence and that of the fragment, it is something to have learned that the stade of the ploughing had already set the standard of the stade of the leuga at or near 185 m.

CHAPTER II.

AFTER the Macedonian entry into Egypt and all through the succeeding Ptolemaic period, Egyptian and Greek measures were naturally still more entangled. This is clearly shown by the evidence of the various papyri recently published. How far they were already naturally connected as simply sharing in the common substratum of widely spread agricultural custom belonging to an already ancient and advanced civilisation, it may not be easy to determine, but there are facts which seem to point to it.

Let us take them for what they are worth. To begin with modern customary measures. *Martini* describes the 'antiche misure' of length at Cairo as follows :

Cassab	.	.	.	3·85 m.
Feddan (20 Cassabeh)	.		77·	m.
Dereghe (4 Feddan)		.	308·	m.
Malacah or Ora di marcia				
(16 Dereghe) .		.	4928·	m.

He describes the superficial measures thus :

Feddan = 24 Chirat or 400 Cassabeh 59·29 ares.
Feddan delle contribuzioni .   . 44·59 ares.

And Doursther states that the feddan of 400 cassabas is still in use by the Arabs.

Recurring to the fragment we should say that this

feddan of 400 square cassabs, except in the fact of its
lower standard, was 4 of the 'smaller jugerum' or
wet-land modius of 2 vorsus. It was in fact a square
of 8 *vorsus.*

The feddan has a further Greek connection in the
fact of its lower standard following the standard of the
khet and medimnus and the stade of 184·9 m. Its
diagonal is $\frac{1}{20}$ of the leuga.

If this feddan might be thrown back into ancient
times when the Arabs on the eastern side of Arabia
were in close contact with Babylonia and on the west
with Egypt, then, in spite of its diminished standard,
we could hardly fail to recognise in the feddan the
quarter of the square of the Breton furrow, which, as we
have seen, contained 9 Egyptian khets. The quarter
of this square had a side of 78 m. and an area of 60·7—*i.e.*
of 8 vorsus of 7·6 ares.

So far, then, as to the Greek connection with the
feddan still in use in Egypt. But was it in ancient
use in Egypt ?

I do not wish to mix up metrological facts derived
from the examination of ancient buildings with the
strictly agricultural measures under consideration. But
Professors Petrie and Griffith agree that the length of
the side of the Great Pyramid of Gizeh was 9069 English
inches—*i.e.* 230·5 m. The area of its base would there-
fore be 531 ares.

The feddan of Cairo, being a square of 20 × 20
' *cassabeh,*' had sides of 77 m. and an area of 59·29 ares.
The side of the feddan is thus as nearly as possible $\frac{1}{3}$ of
the side of the Great Pyramid, and its area $\frac{1}{9}$ of that of
the Pyramid base. I mention this merely as possibly
pointing to the antiquity of the feddan.

When closely examined, moreover, the feddan, though apparently of Arab and possibly of ancient Egyptian origin, has another Greek connection in the cassab of 3·85 m. Though of lower standard, this
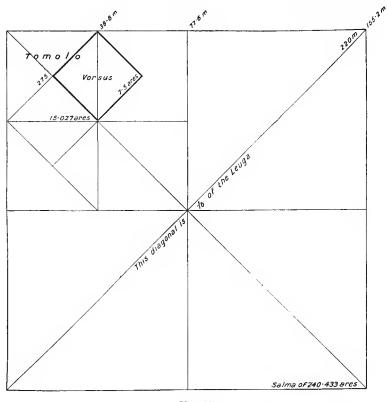
FIG. 48.

cassab nearly equalled two of the canna of Rhodes, described by Martini as of 1·968 m., a measure we shall find at home throughout the Mediterranean basin.

The cassab of the feddan and the canna of Rhodes were both of the lower standard of the Greek and Roman stade of 184·9. In tracing the spread of these

measures by Greek colonists, we must be prepared to allow for legitimate variation of standard.   But with this caution the reader need not be surprised to find land units equal in area to the feddan and rods equal to the cassab, so to speak, naturally sailing away west-wards with Greek or other colonisation of perhaps still earlier date.

Thus it was from Rhodes and Cnidus that the *Lipari Islands* received Greek colonists in the sixth century B.C. according to Diodorus.   And the customary measures of the Lipari Islands as reported by Martini very nearly correspond with the Egyptian feddan.   They seem to confirm the connection of the Egypto-Greek measures with the Italian or Ligurian *vorsus*, for in the Lipari Islands the *tomolo* becomes exactly in area two vorsus of the normal standard 7·5 ares, and the length of its sides is 10 Egyptian cassabs.   (Fig. 48.)

CHAPTER III.

TRACES OF GREEK COLONISATION IN MAGNA GRÆCIA AND SICILY.

In any attempt to distinguish the traces remaining in customary local measures of those introduced by Greek colonists, it is needful to recur to the specially Greek division of the common itinerary measure of the stade fixed at 184·8 into 600 artificial feet of ·308 m. instead of 750 natural feet of ·251 m. Allusion has already been made to this as the basis of the North-Eastern European measures built so steadily on the *medimnus*, and upon the higher standard of this particular artificial foot.
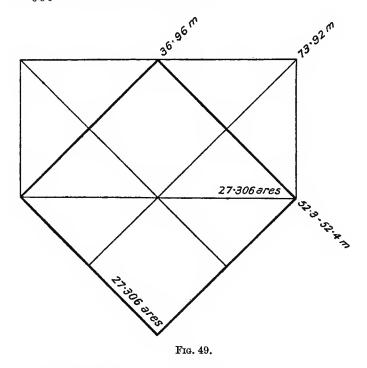
It is worth while therefore to examine closely the measures of the early Greek colony of Cyrene, because we owe our accurate knowledge of the medimnus, and the striking connection of the *medimnus* with the *stade* of the apparently fixed lower standard of 184·9, to the information of the Roman agrimensor Hyginus.

The measures he describes are those of the colony when handed over to the Romans by the last of the Ptolemies (B.C. 95) and still in use in his own day (103 A.D.).

Founded (about B.C. 631) by Dorian colonists from the island of Thera, the colony had from time

to time been reinforced by colonists from other Greek cities at later dates.

Hyginus describes the great land measure of the Ptolemies as having been the *plinth*—a square of 6000 feet of ·308 m. to the side. This foot was the Greek foot of $\frac{1}{600}$ of the stade of 184·8 m.

36·96 m

73·92 m

27·306 ares

52·3-52·4 m

27·306 ares

Fig. 49.

Thus the side of the plinth was really 10 stades of 184·8 m. Its area was therefore literally a centuria of 100 square stades.

Hyginus goes on to state that the plinth contained 1250 '*medimna*,' and that the ' medimnon ' contained 1356 Roman square feet, in two squares like the jugerum. We thus learn exactly the measure of the *medimnus*.

Its short side was $\frac{1}{5}$ of the stade or $\frac{1}{60}$ of the leuga of lower standard. (Fig. 49.)

The square stade contained thus $12\frac{1}{2}$ *medimni*.

This description of the Cyrenian plinth of 100 square stades shows that for agrarian areas on a large scale the stade was the usual Ptolemaic measure and probably that of the Greek settlers.

This is confirmed by the description of the Lille papyri of the third century B.C. of a great square of 10,000 arouras laid out in 40 plots of 250 arouras each;

for if we take the aroura to be the Egyptian khet, *i.e.* the medimnus in a square, the area of the great square of the Lille papyri would exactly equal that of eight of the Cyrenian plinths.

The divisions into the 40 lots were to be made by 3 dykes across in one direction and 9 in the other.
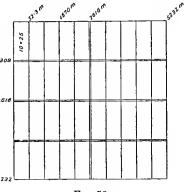
Fig. 50.

The plan given on the papyrus fixes the point that it was to be in a square and the text accordingly describes its circumference as 400 schoinia, and each of the 40 lots as 10×25 schoinia, *i.e.* 250 square schoinia. This makes it clear that the schoinion in this case is equal to the side of the square aroura, *i.e.* of the Egyptian khet and not of the side of one of the two squares of the medimnus.

The *schoinos* of the land measurers in this case at any rate was the side of the khet or 52·30 to 52·40 m.

The object of the document and its plan had reference mainly to the contract for the making of the ditches and therefore measurement directly by the larger measure of the stade would have been out of place. But had the great area been in two squares instead of one it could have been measured by 20×40 stades.

Each of the 40 plots of 250 arouras was equal in area to 20 square stades. And the long side of the plots may be recognised at once as 10 times the furrow of the stade acre when in the form of 1×5, with which we are familiar as the half-diagonal of the square stade.
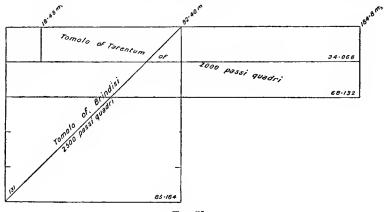
Fig. 51.

Passing on from Cyrene to Magna Græcia and leaving Heracleia for separate consideration we find the customary measures reported by Martini as 'abusively' in use at Brindisi and Tarentum to be again closely connected with the stade of the same standard as that of Cyrene. The *tomolo* of Brindisi of 2500 *passi* of 1·848 m. is exactly $\frac{1}{4}$ of the area of the square stade; that of Tarentum, an early colony of Sparta (B.C. 708), of 2000

passi or two *stade acres*, *i.e.* $\frac{1}{5}$ of the area of the square stade.

It will be noticed that this *tomolo* of Brindisi is in area exactly two of the aroura of 130 cubits of the fragment put into a square.
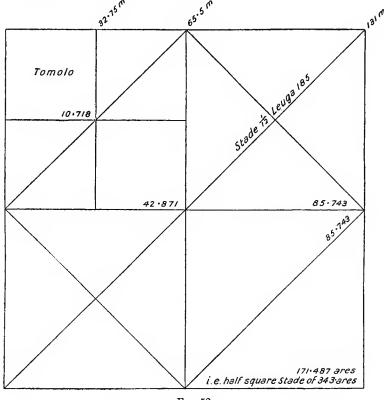
FIG. 52.

Passing on to *Sicily*. *Catania* was a Chalcidian colony of about 730 B.C. The *salma* of *Catania* of 171·487 ares is half a square stade in area, *i.e.* a square of half the diagonal of the square stade. It contains (at a slightly higher standard) two of the Brindisi

tomolos.   And we again recognise in it 4 of the aroura
of 130 Greek cubits of the fragment.

The Catanian tomolo is hardly other than the Greek
plethron of 100×100 four-palm feet of lower standard
of ·328 which equalled in area the *seed-land modius.*
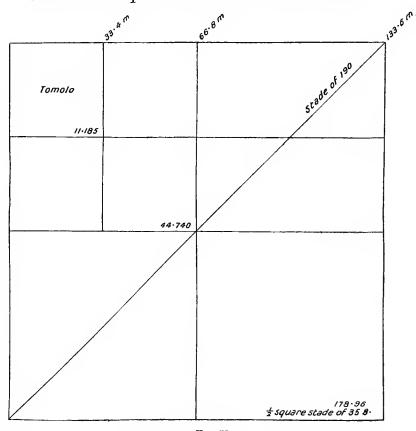
FIG. 53.

Messina, another Chalcidian colony, had nearly the
same measures, but of the higher standard, the side of
the square of the salma being 133·6 and its area 178·960
ares.   The tomolo was the plethron of the Greek four-

palm foot at its higher standard of ·334 and with an area of 11·185 ares.

There are also in Sicily clear traces of the medimnus. The *Caltanissetta* tomolo abusively in use was a square of 52·1 m. and had an area of 27·124, and but for its lower standard it was the khet or medimnus in a square. The salma of 16 tomoli was of 434 ares.
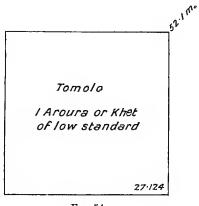
Fig. 54.

It therefore must be admitted that, besides the evidence of the common substratum of agricultural measures covering an area wider than that of merely Greek influences, there are traces of the influences of particular Greek colonies, left behind them by the colonists and maintaining their ground in the habits of the people, in spite of Punic wars and conquests and reconquests of their territory by Carthage or Rome.

CHAPTER IV.

THE AGRICULTURAL UNITS OF ITALY.

I<small>F</small> we regard Italian agricultural units simply from the evidence of the customary areas according to Martini, 'abusively' continued in use in the several districts notwithstanding legislative prohibition, we shall be struck by the fact that the classical Imperial measure —the *Roman jugerum*—seems to have left so small an impression on the usage of the Italian peasantry.

Martini, himself an Italian, naturally gives full place in his metrological work to Italian customary measures. He gives the particulars of those officially recognised and also of those 'abusively' in use in no less than 102 districts, and quite unconsciously to himself the results of his figures are as significant as they are unexpected.

Happily in this case we have not to rely only upon the customary measures 'abusively' in use. We can also go back to historical evidence and compare the results.

To begin with, *Varro* (B.C. 116–28), writing his 'De re rustica' in the retirement of his old age, probably at one of his villas at Cumæ in Campania, or Tusculum, close by Rome, makes the following statement : 'We, *in agro Romano ac Latino*, measure in *jugera*. In *Campania* they measure in *versus*.' And after stating

that what is called the *jugum* is what a yoke of oxen
can plough in a day, he describes the difference between
the *versus* and the *jugerum* to be that the *versus* is a
square with sides of 100 feet, whilst the *jugerum* consists
of two squares or *actus,* with sides of 120 feet.   In *Latin,*
he says, the ' actus ' is called an ' acnua.'   There is
nothing in this statement of Varro taken alone to suggest
that strictly Roman measures were extensively in use
beyond what was acknowledged as strictly Roman
ground. His words ' *apud nos in agro Romano ac
Latino,*' distinctly suggest the contrary. The Latins
of Latium, which lay between his two villas, had not
yet absolutely lost their separate identity. The rich
plain of Campania in which his villa at *Cumæ* was
situated, was not strictly Roman ground, and there
the ' versus ' was in use in his day. Varro does not
mention the fact which later writers do, that the versus
was prevalent in the regions occupied by Oscan and
Umbrian tribes before the Romans came. That he
limited his statement as regards the prevalence of the
versus to Campania did not mean that it was in use
nowhere else. He was making no wider statement
than what was under his own eye as a resident at
Cumæ. He was not thinking of a wider horizon.[1]

In the first century A.D. in a fragment attributed to
Frontinus (at one time Roman Governor of Britain)
is contained a passage which widens the horizon and
ascribes the use of the *versus* or *vorsus* to the Oscans

[1] There is a passage in another of his works (*De lingua Latina,* v. 34, 35) which is important. He describes the ' *actus minimus* ' as contained in 4×120 feet, *i.e.* a slice of the actus making a strip of the form of 1×30, with an area of ·420 ares. If Roman measures were widely prevalent in Italy this unit might well turn up here and there in the customary measures ; but apparently it does not do so.

and Umbrians generally, thus covering the ground occupied by these ancient tribes and by no means confined only to Campania. The writer states that the first ' modus agri ' was the square of 4 equal sides of 100 feet ' quod Græci *plethron* appellant, Osci et Umbri *vorsum.*' Lastly, at about the same date *Hyginus* states that he had found in many places other measures than the jugerum in use, with other names ; for example what is called the ' versus ' in Dalmatia. And he proceeds to describe its contents exactly in Roman feet, making it a square with sides of 100 of the Italian foot of ·275 m. And he adds that to avoid confusion, when the vorsus is in use he gives both measures— ' *jugera tot, versus tot.*'

All this seems to show that at the time of these early agrimensores the Romans kept their jugerum very much to themselves, and that beyond their own ground the vorsus of the Oscan and Umbrian tribes was widely spread and left untouched, though we have no right to press their silence too far as to the prevalence of other measures than the jugerum and vorsus.

One other point may be noticed. The Roman centuria consisted of 100 sortes or 200 jugera, in one great square. But Frontinus states that there are those who call other areas centuriæ, as at Cremona, where there are 110 jugera in the centuria. We may note that whether they recognised the fact or not the centuria of Cremona of 110 jugera would contain 100 Greek medimni, and therefore might very properly be called a centuria.

So also in the ' Liber Coloniarum ' ii. (Lachmann, i. 210 and 261) there is mention of a centuria of 240

jugera as in use in Apulia. This would contain 800 vorsus of 7·55, and may be significant, as we shall find the customary measures of Apulia to be generally multiples of the vorsus.

So much for the evidence of the Roman agrimensores. It has throughout emphasised the importance of the *vorsus* as probably the agricultural unit of the Oscan and Umbrian people, who preceded the Greek and Roman colonies. Before passing to the customary measures, it may be well to recur to the position of the vorsus in the Eastern system of measures. It has been explained already how in the Heronian tables it was connected with one of the two ' modii ' which measured the area for a modius of seed on two different kinds of land. That for good corn-land was the Greek plethron of 100 four-palm feet square, having 32·8–33·5 m. to its side and an area of 10·76 to 11·23 ares. That for inferior land had 120 four-palm feet to a side, with an area of 15·29 to 16·19 ares. The two squares of half its diagonal had each a side 27·5 m., and each was a *vorsus* of 7·64 to 8·09 ares.

We may approach the limits of variation in the vorsus from another direction. The length of the side of the vorsus as described by Hyginus was 27·5 m., *i.e.* $\frac{1}{80}$ of the leuga of lower standard. But if the vorsus varied within the same limits as the leuga, its area would vary between 7·56 and 7·97 ares.

As already said, Martini describes the customary measures of 102 localities in Italy. In 79 cases out of these I have been able, with some confidence, to recognise of what known unit they seem to be multiples.

Most of them will be found marked on the accompanying map.

The analysis of the 79 cases is as follows :—

Ares.

49 are multiples of the *vorsus, i.e.* of one of the two
    squares of the wet-land modius .   .   .   7·56–7·97
15 of the corn- or seed-land modius of   .   .   10·76–11·233
 7 of the Greek *stade acre* $\frac{1}{10}$ of the square stade
 6 of the Roman actus
 2 of the Greek medimnus

The occurrence of the *vorsus, i.e.* one of the two squares of the wet-land modius of the Heronian tables, side by side with the corn- or seed-land modius, was natural, as they belonged to the same system of measures, whilst the connection of each with the same itinerary measure—the leuga—is also suggestive. The side of the vorsus was $\frac{1}{80}$ and that of each of the two squares of the corn-land modius $\frac{1}{100}$ of the leuga.

The predominant fact seems to be that the statements of the early Roman agrimensores as to the prevalence of the vorsus in Oscan and Umbrian lands is fully confirmed and extended by the evidence of the customary agricultural measures as given by Martini.

But before considering further the distribution of the vorsus unit on the map, I am anxious that the reader should be fully aware of the nature of the evidence to be drawn from the *multiples* of the vorsus unit, *i.e.* how the unit is arrived at in places where the local measures are not actually divided into units equal to the vorsus, as well as in cases where they are so divided into units of the area of the vorsus, though no longer so called.

By way of illustration we may take the case of the *soma* of Sinigaglia (near Ancona on the Adriatic).

7 56

7·66

7·66
NOVARA

BRESCIA
7·62   7 62   7·98
MILAN ·77
7·6   PAVIA
TURIN 7·62
7·81
7·6 7·86
ALESSANDRIA
7·7
PARMA

VICENZA 7·56
7 73
VERONA 7·62
7 85   PADUA 7·73
8·08   MANTUA
CREMONA
7·62   7·63
11·16
CENTO 7 55   10·87

7·73
BOBBIO
IMOLA
7 73

NICE
7·72

MASSA   8·0
LUCCA
8·02
11·24

FAENZA 7·67 7·94 FORLI
11·6   7·37 RIMINI

7·8   SINIGAGLIA

FLORENCE

7·8
SIENA

PERUGIA
7·43

7·69
ASCOLI

10·81

ROME   7·7

FOGGIA
7·66

7·66   BARI
BENEVENTO   7·66   7·82
7·66
NAPLES
11·233

LECCE
7·82
8·01

10 76

CORSICA / SARDINIA (islands)

7·85
CATANZARO

LIPARI
7·51

11·185
10·914   MESSINA
13·994 (½ medimnus)   7·61 11·413
PALERMO

REGGIO

10·718
CATANIA
Medimnus   SYRACUSE
27·124   Salma of
GIRGENTI   10 medimni
24·442   279

Carthage

11·21

Martini describes it as having an area of 124·79 ares, and as a square of 400 cannas of 5·58 m. (10 local ' feet ' of ·558). This is the information given by Martini.

It is easy to see that the local ' foot ' of ·558 is two old Italian feet of ·279, 100 of which made the side of
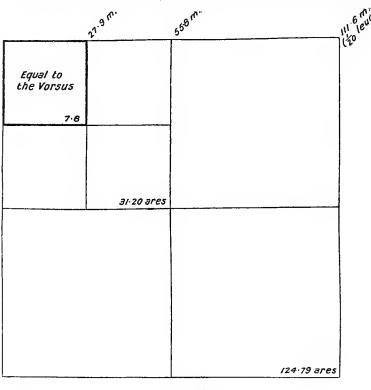
Fig. 55

the vorsus of higher standard ; so the *canna* is really 20 of such feet. A square of 20 × 20 cannas of 5·58 m. would make the side of the soma 111·6 m. (*i.e.* $\frac{1}{20}$ leuga). It would divide, in the usual way of 4 by 4, into 16 *vorsus* of 27·9 m. to the side and 7·8 ares in area. So that here

we get at once not only the *vorsus* but also its connection with the *leuga*.

Further down the coast at *Ascoli* almost the same measures recur.

The *rubbio* of 123·13 ares contains 400 square
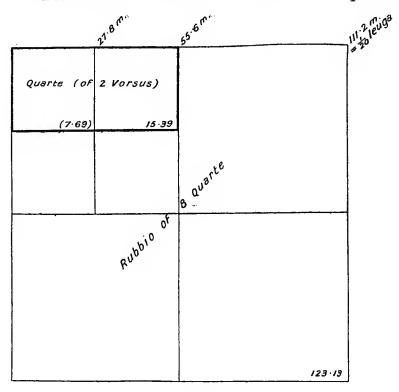
FIG. 56.

canne divided into 8 *quarte* of 15·39 ares, *i.e.* the wet-land modius of 2 *vorsus* of 7·69 ares.

Inland, but still east of the Apennines, the local customary measures are again almost a repetition of those of Sinigaglia. At *Foggia* and *Barletta* the *versura*

is a square of 122·63, *i.e.* 16 vorsus of 7·66 ares, whilst over the Apennines and almost in Varro's Campania the *tomolo* of Benevento is a square of 30·659 ares equal to 4 vorsus of 7·66 ares.

And amongst this nest of apparent multiples of
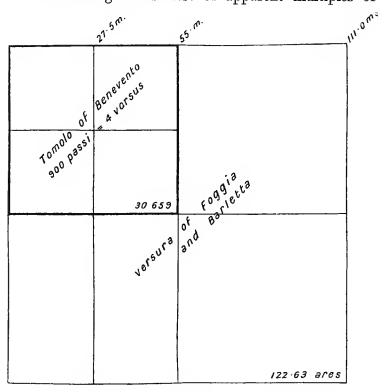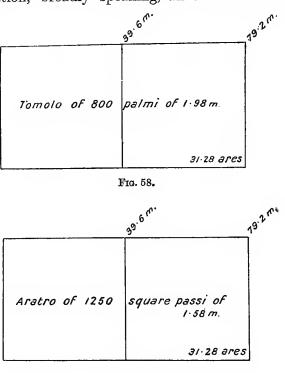
FIG. 57.

the vorsus unit we may note another form of the combination of 4 vorsus, this time put into *two squares.*

At *Bari* on the coast there are reported to be two measures in customary use identical in area but different in measurement and name. (Figs. 58 and 59.)

Here obviously we have 4 *vorsus* of 7·82 ares contained in two squares.

These cases I have treated in detail by way of illustration, broadly speaking, all of them from the

FIG. 58.
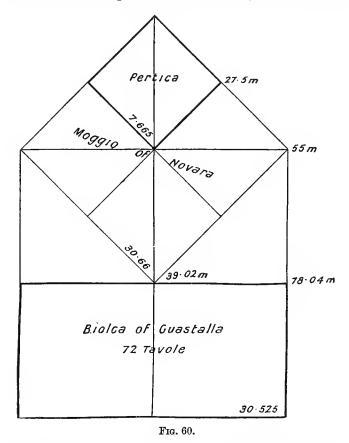
FIG. 59.

Apulian district in the south, hovering round Varro's Campania. But similar illustrations can be taken from North Italy.

Thus at *Novara* and *Varallo* in Piedmont the customary unit is again the square of 30·66 ares—the *moggio*—divided into four pertiche of 7·665 ares, each of which though called a pertica is of the area of the vorsus.

At *Pavia* also the *pertica* of 7·7 ares is the unit in customary use.

So also at *Nice,* the *eminate* of 7·72 ares, though not so called, is again the vorsus unit, and the *starata*

Pertica   27·5 m

7.665

Moggio
of   55 m

Novara

30.66   39·02 m   78·04 m

Biolca of Guastalla
72 Tavole

30·525

Fig. 60.

of 15·444 ares is its double. At the same time the *biolca of Guastalla* is as nearly as possible the *moggio of Novara* turned into two squares.

In Piedmont there seems to be a cluster of customary

Q

measures in use five times the *vorsus* unit instead of four, with an area of 38·104 ares.

At *Turin* the customary unit (before 1818) was the *giornata di Piemonte* of 100 square tavole of 6·16 m., or 400 square trabucchi of 3·08 m. (10 Greek feet), and the local itinerary measure is the mile of 800 trabucchi or 4 of the sides of the *giornata*.

And these measures seem to be common to Mortara and Voghera and are reckoned as containing 5 of the pertica of Pavia, and so we may hardly be wrong in regarding them as multiples of the vorsus unit.
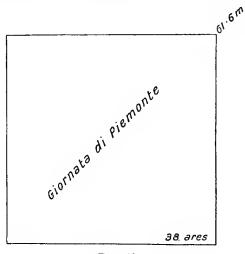
FIG. 61.

There are a few cases in which it may be at first sight doubtful whether the unit in use should be reckoned as a multiple of 3 vorsus or two of the corn-land modius. Thus the *tornatura* of *Cento* is a square with an area of 22·63 ares, which might be either 3 vorsus of 7·55 of lower standard or 2 corn modii of 11·36 of higher standard. So also the *tornatura* of *Faenza* with an area

of 23·02 might be either 3 vorsus of 7·66 or 2 corn modii of 11·5 ares.

But there are not many such cases.

I have been anxious, as already said, by these illustrations to make quite clear on what kind of evidence I have marked on the map the presence of the vorsus unit in the customary agricultural measures recorded by Martini as ' abusively ' in use in various localities.

Unhappily the evidence is absent for Savoy ; but, passing from the Italian evidence of Martini, it may be helpful to cross over the Alps to take note of what can hardly be other than an overflow of the vorsus unit into the French districts contiguous to Savoy. Here we have the evidence of the French Tables with their much greater details of the measures of every commune. In the Département of the Hautes Alpes, *e.g.* :

In 9 cantons or communes the *séterée* or
  éminée is reported as . . . 15·19 ares (= 2 of 7·59)
In two others as . . . 15·65 ,, (= 2 of 7·82)
             15·69 ,, (= 2 of 7·84)
In two others the *éminée* . . . 7·59 ,, (= the vorsus)
             7·97 ,,

In the south-eastern side of the Département of Ain, which is contiguous to Savoy, in the arrondissement of Belley, there is similar and still stronger evidence of traces of the *vorsus* unit.

In 8 communes the *ouvrée* for vines is . 3·799 (= $\frac{1}{2}$ vorsus of 7·6)
  and the *journal* or *seytive* is . . 22·792 (= 3 ,, ,, 7·6)
In a cluster of 10 communes the *ouvrée* is . 7·601 (= 1 ,, ,, 7·6)
  and the *seytive* . . . . 30·390 (= 4 ,, ,, 7·6)
In another of 5 communes the *bichette* or
  mesure is . . . . . 7·598 (= 1 ,, ,, 7·6)
  and the *journal* . . . . 22·792 (= 3 ,, ,, 7·6)
In another of 6 communes the *seytive* is . 22·792
In two others the *ouvrée* is . . . 3·799 (= $\frac{1}{2}$,, ,, 7·6)

In the absence of direct information from Savoy, this evidence of overflow of the vorsus unit into French territory is remarkable and confirmatory of that of Piedmont.   There is nothing but the Alps between the arrondissement of Belley and the Italian district of Turin and Novara.   And we may note that the French evidence confirms the point on which we might other-wise doubt, viz. that the Italian units of 22·63 and 23·02 may fairly be identified as triple multiples of the vorsus unit.

Now at last, taking a general view of the apparent prevalence of the vorsus unit as shown by the map, the result seems to be that it was prevalent over a far wider area of Italy than the Roman agrimensores might have led us to expect, and perhaps than they knew.   It seems to pass the bounds of ancient Oscan and Umbrian occupation into the region of the ancient Ligurian tribes which have always been regarded as belonging to an altogether different race.

The ethnological question thus raised is outside our present object and must not be dwelt upon here.   But there are points connected with the wider extension of the *vorsus* which have a bearing upon the possible travel of agricultural custom and methods, as shown by customary measures, pointing towards Armorica and Britain.   Before we pass westward along the Ligurian coast, or it may be over the maritime Alps to the district round the mouths of the Rhone where the vorsus unit under other names makes itself prominent again in the customary measures of Provence, we may pause to consider how far we may already have taken some steps towards our end.

First we have clearly found in the customary areas,

consisting of 16 of the vorsus unit, connection with the leuga. The sides of these squares are $\frac{1}{20}$ of the leuga. The smaller squares of 4 vorsus units have sides of half that length and are $\frac{1}{40}$ of the leuga.

In those cases in which the area of 4 vorsus is found in two squares, it follows that the sides of the squares must be $\frac{1}{40}$ of the *half-diagonal of the leuga.* Accordingly, in *Modena*, when the unit is in two squares but with a somewhat reduced standard, the area being only 29·22 and 28·36 instead of 30 ares, the *mile* is described as 1569 m. at Modena and 1592 at Reggio de Modena.

The itinerary and agricultural measures seem to have come down separately, but the mile of 1569 to 1592 m. is nevertheless clearly the half-diagonal of the square leuga and 40 times the length of the sides of the square of the area of the 4 vorsus in two squares. Thus if we took the biolca of Guastalla as our pattern, 40 times the side of its squares—39·02 m.—would make a mile of 1561 m. ; whilst if we took the *Bari* example, $39·6 \times 40$ would make a mile of 1584 m. And that these Modena miles from 1561 to 1584 m. are really half-diagonals of the leuga, we may be reminded by the fact that they are practically just 10 times the length of the Breton arpent.

This brings us to the last point which need be noted at this moment, viz. that the long side of the two squares of the 4 vorsus unit is just half the length of the furrow of the Breton arpent ; so that a square of the area of 8 vorsus would become identical with the square of 78 m. to a side which we found to be cropping up on the map between Brittany and the Mediterranean. We arrive at the fact that, consciously or not, the square of the Breton furrow contained 32 vorsus.

CHAPTER V.

WE have seen from the clear evidence of the French
Report that the vorsus unit overflowed across the moun-
tain region of Savoy (as to which unfortunately evidence
is wanting) into the closely bordering district of the
arrondissement of Belley in the Département of Ain.
We have now to examine the continuation of the
Ligurian region extending by the coast to the mouths of
the Rhone, or perhaps overflowing the maritime Alps
into Gaul.

The district in view extends beyond *Provence*. It
very nearly coincides with the eight Départements in
which the olive is grown. Such a region would naturally
be tempting to early Phœnician or Greek colonisation.
Heyn in his interesting chapter on Ancient Olive Culture
favours the view of its introduction by Greek colonists.
Apart from colonisation, its proximity to the Ligurian
district of Italy would make it natural that its agri-
cultural units should resemble those of northern Italy.
The problem of its customary measures has therefore
an interest of its own. The statements of the Roman
agrimensores describing the prevalence of the *vorsus*
in Italy do not directly apply to this district, but in
the absence of direct early evidence an examination of

CHER

NIÈVRE

JURA

SAÔNE et LOIRE

331

ALLIER

H·SAVOIE

1·787
1·867 RHÔNE

A I N

CREUSE

3·797

LOIRE

LYONS

PUY DE DÔME

2·563

ISÈRE

339

SAVOIE

1·678

2·046

CORRÈZE

1 991

341

CANTAL

H·LOIRE

22·982

1·95

333

1·781

22·792

to

1·673

7·597

2·046

H·ALPES

LOT

7·980

DRÔME

1·90 − 2·106

2·003 − 2·071

ARDÈCHE

LOZÈRE

1·992

1·987

1·989 − 2·20

□ 3·94

AVEYRON

1·972 to
1·993

ALPES
MARITIMES

1·97 − 2·10

VAUCLUSE

B·ALPES

GARD

1·97 −
2·05

2·096

TARN

1·974

B·DU RHONE

1·99

□ 3·95

HERAULT

□ 3·95

VAR

1 785

AUDE

1·988

PYRENEES OR.

the customary measures given in the French Tables from which we have learned so much at once presents a similarity suggestive of continuity, which can hardly be misleading.

Looking simply at the extraordinary variety of measures prevalent in this district of olive cultivators as they are given in the Tables, at first sight, it may well seem hopeless to reduce them into any orderly system. But there is at the basis of them all the lineal measure of the *canne* of 8 pans of 8 thumbs or inches.

The length of the canne is remarkably constant within a variation of from 1·97 to 2·1 m.

Taking the Département of the Bouches du Rhône as typical, in 35 out of 39 communes the canne varies between 1·97 and 1·99, and in only four communes is a higher standard prevalent.

The area of the square of 100 (10 × 10) square cannes would vary between 3·89 and 3·95 ares, *i.e.* half the vorsus unit of from 7·78 to 7·90 ares.

And as in this Département the larger measures are generally multiples of the square of 100 square cannes, they become multiples of the vorsus unit.

In order to put the evidence in the simplest shape I have marked on the map the length of the *canne* of each Département belonging to the district. It will be seen that the canne varies from about 1·97 to 2·1 m.

The canne is of 8 *pans*, and taking 1·99 m. as its average length the pan would be ·249 m. The pan, therefore, is the natural foot (·246–·251 m.), but the natural foot or pan is here divided into 8 thumbs or inches instead of the usual 9. Why is this ? The reason seems to be found in connection with the Italian vorsus-foot of ·275 m., which passes over or through this

region to become the customary foot of Spain.   The vorsus-foot divides into 9 thumbs and 8 of them make the pan of ·249 m.

The length of the *canne* of 8 pans is 8 natural feet, or 6 of the Greek four-palm foot of ·332 m., the decempeda of which becomes the estadal of Spain.   The four-palm foot, moreover, extends northward and becomes the customary foot of the Burgundian district; and further north Drusus used it in laying out the conquered lands of the Tungri, where it became known as the Drusian foot.

The larger agricultural areas are generally multiples of a unit of 100 square cannes, and the area of this unit is just half that of the *vorsus.*

Four of the squares of 10 × 10 cannes equal in area the wet-land modius.   The favourite multiples are those of 1600 and 1800 square cannes.   The 1600 multiple brings us again to the quarter of the square of the Breton furrow but of higher standard.

If we turn to the Alpine Départements the canne of the *Basses-Alpes* is still 1·986 m., and the journal 500 square cannes—*i.e.* 5 half-vorsus.

In the *Alpes-Maritimes*, the séterée is 15·445 ares, *i.e.* two vorsus of 7·72 ares.

In the *Hautes-Alpes* the canne is 1·95 m., but the measures generally are too various to make it worth while to dwell upon them.

It is more to our purpose to recur to the *canne* and its peculiar structure, its division into 8 pans, equal to the natural foot of 3 palms or 9 thumbs, and the division of the pan into 8 thumbs instead of the natural nine.

In this Ligurian district we seem to have a system of agricultural measures built upon the *pan* or natural

foot and producing a unit equal in area to the *vorsus* in two squares and a *wet-land modius* of 2 vorsus making one square. Now turning back once more to the Danubian district (Jassy), we cannot fail to note a striking coincidence amounting to practical identity in the details and method of the construction of the agricultural unit. Answering to the *pan* of the Rhone Valley is the Danubian *palma* of ·248 m., *i.e.* the natural foot, and as we have seen, both are divided into 8 thumbs instead of the natural nine. As already said, we may even see a reason or excuse for this, for adding a ninth thumb to the natural foot of ·248 the addition at once makes the ·279 foot of the vorsus known to the agrimensores and the Heronian table as the Italian foot. Nor is this all. For the Danubian ' *stingeni* ' of 8 palms (1·98 m.) answers exactly to the canne of 8 pans of Provence.

Finally, coming to the larger units the result is a multiple in the one case of the *corn-land modius* and in the other of the *wet-land modius* of two vorsus. Whether the original route of importation was by the Danubian route, or round by the sea, the result is the same ; there is the common tradition and possession of a system of measures and methods in agricultural matters engrained in the minds and habits of the people by long-continued custom in the lower valleys of the Rhone and of the Danube.

The prevalence of the Oscan and Umbrian *vorsus* in Italy over a wider region than could be easily explained by Greek colonisation points to these local customary measures—especially the vorsus—being an earlier common possession on both sides of the Maritime Alps, allowed to continue by the Phœnician and Grecian intruders into the region of the old Ligurian inhabitants.

The fact that in both districts they are based on the natural foot, though disguised as the *pan* or the *palma*, points to the early absorption of these land units in the common substratum of agricultural usage over a wide region of Western Europe.

CHAPTER VI.

PURSUING the inquiry into Spain, the customary units
of agriculture seem to belong to two types crossing
one another, closely connected and yet representing
apparently two separate influences.

First, we note that the Italian *vorsus-foot* of ·274
to ·279 m. has become the national foot of Spain, and
the *estadal* of 3·28 to 3·35 divided into 12 of these feet
is widely prevalent.

Here evidently we come once more upon the Ligurian
vorsus, for 10 × 10 of the estadal would make a square
with 32·8 to 33·5 m. to the side, *i.e.* the Greek plethron,
one of the two squares of which when put into that
form is the vorsus as described by Hyginus.
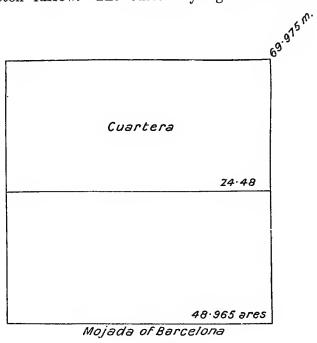
Secondly, besides these connections with the vorsus,
we seem to get more or less direct traces both of the
Breton arpent with its 156 m. furrow and area of 48·624
ares and also traces of the square of half its furrow with
an area of 60·78 ares.

The *first* set of measures seems to have become
the Castilian or national ones, whilst the *second* seems
to keep pretty closely to the Mediterranean coast, as
though the result of maritime or colonial enterprise
from the East.

As the *estadal* is the rod of the Castilian group and

is of the *higher* standard, so the *canne* of the coast districts becomes the rod of the units which seem to aim at the Breton arpent, and is of the *lower* standard.

Thus, to begin with the maritime district, the *canne* of Barcelona was 1·555 m. in length, *i.e.* $\frac{1}{100}$ of the Breton furrow. The customary agricultural unit of

Mojada of Barcelona

Fig. 62.

Barcelona was the *mojada* of 2025 square cannes forming a square of 45 × 45 cannes, or 69·975 m. to a side.

Thus the square of the mojada was very nearly equal in area to the Breton arpent (48·624 ares) and the canne very nearly $\frac{1}{100}$ of the Breton furrow—1·555 m. (the Breton furrow being 155·9 m.). The mojada of

Barcelona was thus practically the Breton arpent in a square, and being divided into two *cuartera*, each of the latter equalled in area the Breton half-arpent.

Between *Barcelona* and *Valencia* lies the coast town of *Tarragona*, which gave its name to the *Tarra-conensis Provincia*. Its agricultural unit was the ' *cana de rey* ' reported to contain 2500 square cannes.

Fig. 63.

The ' cana ' was again 1·56 m., *i.e.* $\frac{1}{100}$ of the furrow of the Breton arpent. 50×50 of this cana made a square of 78 m., *i.e.* half the Breton furrow and containing an area of 60·84 ares.

This quarter of the square of the Breton furrow is identical with that marked upon the map showing the extent of the prevalence of the Breton arpent, which

was seen stretching southwards from the Breton district to the Mediterranean (see p. 131).

Inland from Tarragona at *Saragossa* the *braza* or *estado* of 1·543 (2 varas of ·771) seems to be a reduced example of the Tarragona cana. The *cuartal* of 4 almudes of 100 square varas, *i.e.* 20 × 20 varas, had an area of 2·38 ares, *i.e.* $\frac{1}{25}$ of a ' *cana de rey* ' reduced to 59·50 ares. The tendency seems here to be to lower the standard beyond even the ordinary limit of variation.

In *Valentia* the customary measures are peculiar. The *cuerda* or corde is of 20 × 20, *i.e.* 400 square brazas
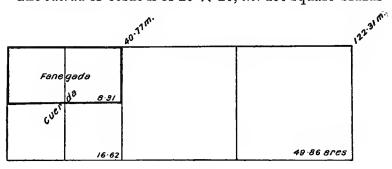
Fig. 64.

of 2·038 m., and the *fanegada* consists of two squares each of 100 square brazas. It is therefore half the square cuerda (see fig. 64).

Here again we have repeated, with a slightly exaggerated standard, in the *braza*, the *canne* of the French Ligurian district; in the *fanegada*, the *vorsus* in two squares ; and in the square *cuerda*, the *wet-land modius*—all of *higher* standard.

But the *Valentian* measures present another feature, connecting them again except in standard with those of Barcelona. Six Valentian fanegada made a *cahizada*,

with an area of 49·86 ares, thus slightly exaggerating the area of the Barcelona *mojada*. So here again we are reminded of the area of the Breton arpent, but in this case put into three squares instead of forming one as at Barcelona, and with exaggerated standard.

Further a still larger agricultural area is reported, viz. the *yugada* of six cahizadas with an area of 299 ares and in the form of two squares. There may perhaps be traces here of a conflict between the two influences and two standards and an attempt to bring them roughly into harmony.

Passing still southward on the coast we find reported both for *Malaga* and *Cadiz* that they shared more or less in the ancient measures of Castile.

But for *Malaga* an agricultural unit is reported in a *fanega* of 60·370 ares containing 8640 square varas. This fanega is again ¼ of the square of the Breton furrow like that of Tarragona, but it is described in an odd number of Castilian varas.

For *Cadiz* on the other hand Martini reports that the ancient agricultural measures were those of Castile.
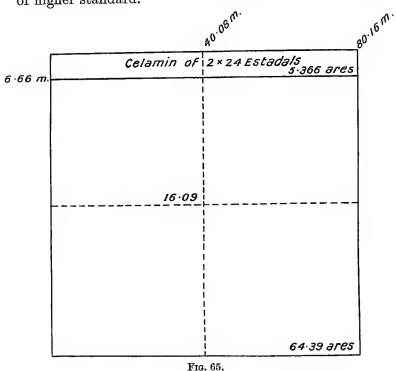
We are thus left much in the dark as to the original customary measures of the ancient Bætica.

Passing now from the customary measures of the maritime districts to those of *Castile,* as reported in use before the year 1800, we come back to the *estadal* of 3·34 m. divided into 12 of the familiar Italian vorsus feet of higher standard, viz. ·279 m.

The chief Castilian agricultural unit, according to Martini, was the ' *fanegada de tierra,*' a square of 24 × 24 estadals with an area of 64·39 ares and divided into 12 celamin of 48 square estadals. (Fig. 65.)

Consciously or not, this ' fanegada ' contained 4 of

the wet-land modius or 8 of the Ligurian vorsus, but of higher standard.

FIG. 65.

There was also an *aranzada* for vines, a square of 20 × 20 estadals with an area of 44·72 ares.   (Fig. 66.)

And this, whether so recognised or not, was equal to 4 *corn-land* modii again of higher standard, each modius being a square of 100 Greek four-palm feet to a side, so that both the *wet-land* and the *corn-land modius* were present or hidden in the Castile measures.

Martini also mentions   yet another *fanegada* or *fanega* of 4900 square *varas* of Castile.   The vara seems to have been that of Burgos, ·835 m. in length,

70 × 70 of which would make a square of 58·52 m.,
with an area of 34·238 ares. Here we have clearly,
consciously or unconsciously to local knowledge, the
stade acre, *i.e.* $\frac{1}{10}$ of the square stade in area, here put
into a square.

The same agricultural unit is reported as in use on
the coast of the Bay of Biscay at S. Sebastiano, where
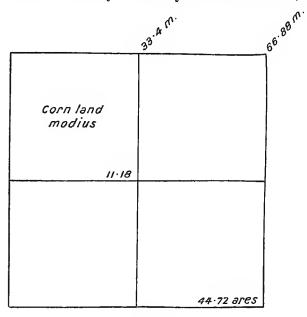
FIG. 66.

the *vara*, like that of Castile and Burgos, is ·837 m.
and the fanega of 70 × 70, *i.e.* 4900 varas, becomes a
square of 58·59 m. with an area of 34·328 ares.

So much we learn from Martini of the smaller
agricultural customary units of Castile. He reports,
however, two larger units : (1) The Castilian *yugada* of
50 fanegadas forming two squares (401 × 802 m.) and
containing an area of 3220 ares. This yugada would

R

thus equal in area 200 wet-land modii or 400 vorsus of higher standard ; (2) a still larger unit, the *caballaria* of 60 fanegadas, with an area of 3864 ares, thus containing 240 wet-land modii or 480 vorsus of higher standard.

We may note here also that the *vara* of Castile or Burgos was connected directly with the Spanish itinerary measure—the *lega real.* This ' lega ' was 8000 varas or 2000 estadals in length, *i.e.* 6687 m., being thus of the same length as the *Welsh milltyr* of 1000 Welsh land-ends, but measured by the higher standard of the natural foot and equal to three leugæ of 2229 of 12 stades of 185 to 186 m.
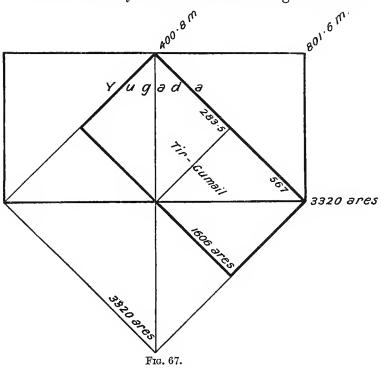
We note at once that the side of the *aranzada* (20 estadals) is exactly $\frac{1}{100}$ of the length of the ' lega real.' And what is still more striking is that the small end of the *celamin* of 2×24 estadals was $\frac{1}{1000}$ of the ' lega real,' thus possibly suggesting a common tradition with that involved in the 1000 land-ends of the Welsh milltyr.

But it is not so with the yugada. To bring it into direct connection with the lega real and the leuga, its two squares must be converted into one square, and then, within the normal limits of variation in standard, its side (567 m.) would be equal to $\frac{1}{4}$ of the *leuga* or $\frac{1}{12}$ of the Welsh milltyr and the Castilian lega real, all of the higher standard.

In whatever form, in one square or two squares, consciously or not, *the area of the yugada of Castile was* $\frac{1}{16}$ *of that of the square leuga.* We may note also that it was just double in area that of the lesser Brehon ' tircumail.' That is to say, one of the two squares of the yugada would equal the tir-cumail on the lower

standard of the natural foot. It may be remembered
that the Brehon tir-cumail, like the yugada, was built
up upon the foot of 4 natural palms.

On the lower standard of the natural foot the tir-
cumail was exactly as below. On the higher standard

FIG. 67.

it would be 289 × 579 m., but though measured in
Ireland in natural feet of lower standard its sides are
divisions of the leuga of higher standard. It may
further be noted that the yugada put into a square
of two tir-cumails would contain almost exactly 128
Roman jugera in the normal shape of two squares
and 40 Normandy acres 1 × 10. In its present shape
of two squares the yugada would contain 80 English

statute acres in their proper form of 1×10. The meaning of all this is a part of the problem to be explained.

If we may take the customary measures of *Lisbon* as representing those of *Lusitania* the agricultural unit was the *geira* of 4840 square *varas* of 1·09 m. or 1210 square *braças* of 4·36 m. The area of the braça being 4·778 and that of the *geira* 57·816 ares.

We get little guidance from this except that in form the geira was 1×10 and that in area it would contain 5 corn-land modii of 11·56 ares, or 2 medimni of 28·91 ares, in either case of too exaggerated standard, if standing alone, to be relied upon for any inference of origin. It should be noted, however, that the furrow of the geira is of the same length as the long side of the Valentian yugada.

The *estadio* of Lisbon is almost identical with the length of the furrow of the Irish and Northumbrian acre, viz. 256 m., though it does not seem to enter into the agrarian measures.

Before we pass from the Spanish customary land units as given by Martini, the reader should be reminded that the evidence has been confined to that of the Spanish customary measures reported from the modern point of view as ' abusively ' in use in spite of modern legislation.

It may be worth while to consider whether there may not be some direct historical evidence in support of or against their antiquity. Unfortunately it lies in very small compass.

Speaking of *Bætica* Columella (' De re rustica,' V. ix.) mentions an ' actus ' of 120 feet square which the rustics called an *agnua*. If it had been identical with

the Roman actus he surely would have said so. We may take it therefore that it differed from the Roman actus. Now the Spanish *estadal*, being 10 Greek four-palm feet in length, divided in Spain into 12 of the vorsus-feet, though of higher standard, seems more likely to have had a Greek or Phœnician than a later origin. It may probably even have belonged to the common substratum of still earlier agricultural tradition. And if we may take the 120 feet of the side of the *agnua* as so many Spanish customary feet, *i.e.* of ·279 m., then we bring the *agnua* back at once to a square of 10 × 10 of the estadal, *i.e.* of 100 Greek four-palm feet to the side, which we have seen to be the customary Castilian *aranzada* for vines containing 4 corn-land modii of higher standard.

Columella also on the same page mentions another measure called the '*porca*,' which he describes as 30 feet in breadth and 180 in length. Assuming as before that the feet were the Spanish customary feet of ·279 m. the area of the *porca* would be from 4·083 to 4·192 ares, *i.e.* half the vorsus of higher standard, or one of the two squares of the '*fanegada*' of Valentia. It would be very nearly $\frac{1}{16}$ of the Castilian '*fanegada de tierra*' of 64·39 ares.

There is not much reliance perhaps to be placed on this scant evidence, but so far as it goes it seems incidentally to confirm the antiquity of the customary agricultural units.

Now, if on a review of the Spanish agricultural customary measures we were tentatively to divide them into the two sets—(1) the *Castilian* measures pointing back to the *vorsus* or wet-land modius, and (2) those, chiefly on the maritime border, pointing

towards the Breton arpent, we should have to recognise the significant fact that the *Castilian* itinerary and agricultural units seem to be consistently based upon the higher standard of natural measures, whilst the *Maritime* units seem to be as consistently based upon the lower standard.   The variations in standard being within natural limits might perhaps be overlooked if they were not so constant, and if there were not a more or less obvious reason why the maritime measures like the Breton measures to which they seem so clearly to point should be based on the lower standard.   We have all along seen reason to suspect a connection between the Breton furrow and the Egyptian khet. The Breton furrow of 157 m., being three times the length of the side of the khet, naturally perhaps could not well wander away too far from the Egyptian standard or that of the Cyrenian medimnus.   And the fact remains that it did not.

On the other hand, if we turn to the Castilian land measures with their estadal of 3·34 m. and foot of ·279 m., both of the higher standard culminating in the *yugada,* and note the connection in area with the smaller Irish tir-cumail whose sides were divisions of the leuga, of *higher* standard, we cannot avoid connecting it further with the Normandy and British statute pair of acres, both of which are of the higher standard.   The closeness of this connection is shown by the fact that the short side of the yugada of Castile is as nearly as possible two furrows of the British statute acre, whilst the diagonal of one of its squares is consequently of the same length as two furrows of the Normandy acre.

So that whilst the maritime land measures point

to the Breton arpent, the Castilian land measures point to the Brehon tir-cumail and the Normandy acre and its connection with the Roman jugerum.

The strange consistency in the matter of standard forbids our ignoring it. If we start with the Italian vorsus as described by Hyginus, it is a square of 27·5 m., 100 feet of ·275 m. The side of the *vorsus* was thus $\frac{1}{80}$ of the leuga of 2200 m., *i.e.* the lower standard. If Spanish customary measures had kept to this standard the foot would have been ·275 m. and the estadal 3·30 m. The Castilian ' *lega real* ' of 2000 estadals would have been 6600 m.—a milltyr of 3 leugas of 2200 m.—and the whole stream of measures, Castilian and Maritime, would have fitted on, so to speak, at both ends with the Italian vorsus at one end and the Breton and Cornish measures at the other end. But the facts seem to conspire in showing that it was not so, but rather, that some stream of influence or two separate streams had been continuously at work making and perpetuating the same difference of standard both between the Maritime and Castilian measures in Spain and also between the Breton and the Normandy measures in the north of Gaul, not even stopping there but crossing the Channel and becoming just as prominent (as we have seen) in Britain. This is an important element in the problem which, as far as the Italian and Spanish evidence goes, we carry with us in returning to the consideration of the group of Armorican and British customary 1×10 acres which form the special object of this inquiry.

CHAPTER VII.

THE LAND UNITS OF THE DISTRICT BETWEEN THE LOIRE AND THE GARONNE.

THERE is one more district in Gaul requiring special attention, viz. that occupied in the time of Cæsar by the Pictones and the Santones between the mouths of the Loire and the Garonne.

We have already noticed that on the Spanish shore of the Bay of Biscay the stade acre in a square was a fairly prominent land unit, whilst it was not so in other parts of Spain. Crossing to the Gallic side of the Pyrenees in the Département of the *Landes* the stade becomes all at once almost the only and certainly the predominant land unit.

But the sides of the squares which are in area divisions of the square stade are not divisions of the stade itself but of its diagonal, just as the Breton furrow is not a division of the leuga but of its diagonal. There may be a significant reason in this.

The arpent of ' St. Sever,' according to the French Official Tables, is prevalent in 134 communes of the Département of the *Landes*. Its area is 42·208 ares,[1] *i.e.* $\frac{1}{8}$ of the square stade of lower standard; and in 52 communes its double, 84·170 ares, is prevalent, being $\frac{1}{4}$ of the same square stade.

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[1] The same area and standard as the feddan but probably with no direct connection.

The new point, however, is the appearance of a customary acre or *journal* of 65·950 ares still more at home between the Loire and the Garonne. This *journal* can hardly be other than that of *two stade acres, i.e.* $\frac{1}{5}$ of the square stade somewhat below the usual lower standard. Its area is almost exactly that of the *Irish* or *plantation acre with a furrow of* 256 m., but here it is in a *square.*

We have again and again been puzzled by the absence from the associated acres of this specially important member of the group, and we have more than once been tempted to consider that it might be after all a double stade acre of unusually low standard. As we find its equivalent here in the form of a square between the mouths of the Loire and the Garonne in the midst of stade acres or divisions of the square stade, notwithstanding the lower standard and the change of form, we can hardly hesitate any longer to identify both with the double stade acre. (See above, pp. 110 and 137.)

Thus the typical Irish acre and the journal of the Gallic Pictones are brought into connection independently of the question of connection between Gallic and British and Irish Picts.

As the mouth of the Garonne is approached, in the Département of *Charente* and of *Charente-Inférieure,* where the stade acre ($\frac{1}{10}$ of the square stade) is strangely predominant, it resumes its usual area of 34·189 ares instead of the Pictish 33 ares, and is a square of 58·50 m. to the side.

The real home of the acre of the Pictones is obviously in the district near the mouth of the Loire, from which maritime intercourse with Ireland would be most likely to take place.

Now if by this identification of the acres of the Pictavi on the Loire with the typical Irish acre we may be led to look upon the latter as pointing to maritime connection with the Picts of Ireland and Britain, we also seem to find a way of escape from the naturally misleading inference from geographical position that the so-called Irish or Plantation acre might be of Cumbrian, Northumbrian, or Brigantian origin. We may possibly look upon it as a *Pictish* acre, if after all it be not simply a double stade acre, and therefore colourless as to origin and spread over Britain. In either case, considering its prevalence so near to the Roman wall and the district of the struggle with the Picts and Scots, the stade acre or its double would become quite naturally at home in that region as an Irish acre.

But if without wandering too far outside the evidence of the acres themselves we follow Professor Ridgeway's interesting conclusion that in the *Cuchulainn Saga* there is proof of connection in chariots and other things with the *La Tène* stage of civilisation, then we are led away to *Ulster*, close to *Armagh*, for the goal of early Gallic maritime enterprise into Ireland. For it was there that *Conchobar* and *Cuchulainn* fought their battles from their *chariots*, and it is worth marking also that it is in Yorkshire, where the Irish acre is so prevalent, that the remains of burials with chariots are found.[1] So the evidence of the La Tène influence brings together the regions on both sides of the Irish Sea, and especially of the Solway Firth.

Nor need we be surprised that St. Patrick's and St. Columba's labours should be centred in this region

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[1] Ridgeway's *Date of the First Shaping of the Cuchulainn Saga*, p. 6.

and that in fact the Solway Firth became the centre of Irish and British monasteries and missionary spirit. However this may be, it is enough at the moment to note that there may be in the practical identity in area of the acre of the Pictavi with that of the typical Irish acre some hint at least of the existence and direction of maritime intercourse between the mouth of the Loire and the Channel, during the late Celtic period.

Returning to the Gallic acres of the Pictones it is important to notice how acres of the higher standard seem to be intruding into this home of lower standard acres.

In the Département *de la Sarthe,* where the journal corresponding in area with the Irish acre is at home and lower standard acres are prominent, there is a journal of 80 perches with an area of 39·629 ares. What is this but two British half-acres forming half of a Normandy acre of lower standard ? And side by side with it is the square arpent of 71·4 m. with an area of the exaggerated Roman sors 51·072 ares in area, instead of the real Roman sors of 50·296 which, all the while, was present in lower standard in an arpent of 70·41 m. to the side and with an area of 49·536 ares.

We seem thus to mark here an overlapping of the higher standard over the lower, without, however, eradicating it. And, our eyes thus opened, as we pass gradually eastward, we seem to see more and more evidence of the acres of lower standard having once had a wider spread westward, and then at some later period having been submerged by the influence bringing in the higher standard. To verify this fact the reader has only to recur to the maps showing the spread of the associated acres individually to satisfy himself that

something like this must have happened. Almost every one of the acres appears in the double relation of lower and higher standard in different communes without variations between.

But the point to which attention must be drawn at this moment is the fact that the region on both shores of the Solway Firth, where the Irish Plantation acre was so prominently at home, was also the home of the acre of Dalriada with a furrow of 228 m. and that further north and covering most of Northern Scotland, with a furrow of 226 m., these customary acres have held their own to the present day and been adopted as *the* Scottish acre. But what is this Scottish acre, with its area of 51·423 ares, but the Cornish acre of somewhat exaggerated higher standard ? It is so closely identical in area, though not in form, with *the enlarged Roman sors,* whose intrusion in the Pictavian district of lower standard round the mouth of the Loire has attracted our notice, that one is tempted to ask whether it may be the enlarged Roman sors put into the form of 1×10.

PART VI.

THE PROBLEM OF THE BRITISH AND ARMORICAN ACRES.

WE have returned at length, after a round of extended inquiry, to the main object in view, viz. the consideration of the problem involved in the historical position of the Armorican and British customary acres, on the evidence of the acres themselves. The evidence may be shortly summarised as follows :—

They lie, speaking broadly, in a group by themselves in a corn-growing country. Nowhere else have we found a similar group, except perhaps in the Venetian end of the Po Valley. The acres are peculiar in their adherence to the 1×10 form. Even when divided into two half-acres the half-acre must be in the form of 1×10.

The 1×10 form may occur sporadically in isolated instances elsewhere, but nowhere else does it seem to dominate a group.

The fact that their furrows are mostly divisions of the itinerary measure common to Gaul and Britain or of the diagonal of its square is another important feature. It gives a distinctive character to the closely associated group. Above all, the intimate connection of these customary acres with a remarkably similar form of the open field system of husbandry forming the basis of the village community binds together, so to speak, into one traditional system the methods and

custom of Armorican and British agriculture.   It lends
interest and confirmation to the historical statements
of Pytheas and Caesar as to the early importance of the
corn crops of both countries.

Not that the common features of their open field
systems belong to them exclusively and appear nowhere
else.   Far from it.   The inquiry into the agricultural
units of other countries has led us to recognise that
the peasantry of the British and Armorican corn-
growing districts shared with the rest of Europe in
the common possession of an ancient substratum of
agricultural custom by no means confined to the
geographical area of the group.   We have not been
able to trace the line of travel of the group of customary
acres, *as a group,* into its Armorican position.   But
by following the line of the common itinerary measure
we have found members of the group sometimes left
stranded here and there as it were along what may
have been the lines of agricultural advance westward
from the great corn-growing plains on the Euxine or
from the Mediterranean basin, or even crossing the
Alps between the valleys of the Danube and the Po.
But that stragglers away from the group might linger
along the lines of travel is one thing.   What the move-
ments of population may have been which pressed the
people owning the group of acres to settle in the
Armorican ' Land's End,' and what forced an overflow of
them, with their acres, across the Channel into Britain
and Ireland, are quite another thing.

In order more closely to realise the extent of this
pressure of the associated acres into a group it may be
well to turn once more to the French Tables for the
single Département of Calvados.   It may help us to a

conclusion whether it be worth while to follow further
the indications in the Spanish evidence of a separate
origin of the Breton and Normandy acres.

The Table for the Département of Calvados first
mentions the ' toise of Paris ' of 1·949 m.   This is almost
identical with the *canne* of the Ligurian district, and
the *stingeni* of Moldavia and the Euxine plains, and the
Egyptian *cassab,* which were practically alike, and all
of which based their customary itinerary measures not
on the leuga but on the diagonal of its square.

Next it is mentioned that there are two distinct *feet*
in use in the Département.

1. The Paris foot of 12 thumbs	·325 m.
2. The foot of 11 thumbs	·298 m.

The latter is obviously an enlarged Roman foot, *i.e.*
·2955 m. enlarged to ·298 m.

Then follows a list of *perches* founded upon these two
feet.   All these rods are reported as in use in the
Département of Calvados.

Of feet of 12 thumbs (·325)		Of feet of 11 thumbs (·298)	
Perche of 24 feet	7·796 m.	Perche of 24 feet	7·152 m.
,, 22 ,,	7·146 m.	,, 22 ,,	6·551 m.
,, 18 ,,	5·847 m.	,, 18 ,,	5·360 m.
,, 16 ,,	5·197 m.	,, 16 ,,	4·764 m.

Here surely is confusion and complication enough to
bewilder the peasantry of a single Département.

But mark how the confusion vanishes when attention
is turned to the acres.

The acres are as follows in their 1×10 form of
4×40 perches.

(1) 4×40 of the perch of 7·15 (22 feet of ·325 or 24 of ·298) make
the *Normandy* acre.

(2) 4×40 of the perch of 7·796 (24 feet of ·325) = two *Breton*
acres.

(3) 4×40 of the perch of $5\cdot85$ (18 feet of $\cdot325$) $= \frac{1}{2}$ *a.* of 329 *acre.*

(4) 4×40 of the perch of $5\cdot197$ (16 feet of $\cdot325$) $= \frac{1}{2}$ *a.* of 292 *acre.*

(5) 4×40 of the perch of $4\cdot764$ (16 feet of $\cdot298$) $= \frac{1}{2}$ *a.* of *Jersey* 268 *acre.*

(6) 4×40 of the perch of $6\cdot55$ (22 feet of $\cdot298$) $= 2$ *stade acres.*

Thus in the single Département of Calvados nearly all the associated acres (common to Britain and Armorica) find a place. *And all of them, with the exception of the Normandy acre,* and British half-acres and the stade acres, *are of the lower standard and belong to the Breton group.*

Besides these there are three acres reported in the form of a square, *viz.* :

(1) The quarter of the square of the Breton furrow $= 60\cdot780$ ares.

(2) The arpent of 'waters and forests' (10×10 perches of $7\cdot146$) $= 51\cdot072$ ares.

(3) The arpent of St. Sever $= 42\cdot915$ ares,

and one or two stray acres on which we need not dwell.

Now though the Table describes these acres in all the details of different feet and perches, it, of course, tells us nothing of what may have been their original object and importance.

It does not tell us that the 329 m. acres contained 4 Greek medimni or Egyptian khets, and 10 corn-land modii.

It does not tell us that the 292 m. acres contained 8 corn-land modii.

Nor does it tell us that the Normandy acre and the British half-acres into which it was changed in crossing the Channel, were strangely entangled with the *wet-land modius* and *vorsus* of higher standard and with an enlarged Roman sors of two jugera. Probably at the date of the Table these facts of original meaning and

importance had already for one or two thousand years been absorbed unconsciously in the common substratum of agricultural custom. But however hidden and forgotten, still these facts have remained embedded all the time in the structure of the acres just as they were in their origin.

Notwithstanding, however, that in the construction of so many of the group of 1 × 10 acres the presence of the Greek corn-land and wet-land modius may be referred to the pre-Roman substratum of custom, it would be absurd to assume that centuries of Roman rule may not have left their marks upon them.

We have already seen traces of it. And it may be well to consider them more carefully.

We have already seen that, according to the Table of Calvados, all the acres, except the Normandy acre, its British half-acre and the stade acre, are distinctly of the lower standard. These three alone are of the higher standard.

We have seen that the Normandy acres were measured by two different feet—the ordinary French foot of ·325 m. and the enlarged Roman foot of ·298 m.

And if we were to mark on the map the geographical area over which this enlarged Roman foot is reported as still in use, we should hardly doubt that its home had been in the Roman province of which *Trèves* was the capital city. We could hardly refuse to recognise that from this centre of Provincial Government it had extended without intermission from Trèves to Normandy.

That in some communes the peasantry should still prefer the enlarged Roman foot of ·298 m. to the ordinary French foot in measuring the acres suggests a Roman survival with a meaning worth examination.

It is very significant that had the Paris forest acre
been a square of 240 Roman feet of ·2955 m. instead
of ·298, or 10 × 10 rods of 7·11 m. instead of 7·146, *it
would have exactly corresponded to the Roman sors of
two jugera.* Its area would then have been 50·29 ares
instead of the exaggerated area of 51·072. And the
relations to it of the furrows of the Normandy and
British acres would have adapted themselves accordingly.
But as the Breton region seems to have been one of
persistently *lower* standard, so the Normandy region
seems to have been one of *higher standard.* This is
seen in the continuance of the higher standard in the
overflow of the Normandy acre in its two or fou r half
acres across the Channel. The British statute acre-
retains the higher standard of the Normandy acre.

We are surely dealing with a Græco-Roman measure
in a district of *higher* standard deeply rooted in
local custom previous to Roman occupation. For the
inference to be drawn from the rise of the Roman
foot from ·2955 m. to ·298 in the measurement of the
Normandy acre is that the Romans raised their measure
to make it correspond with local standards too deeply
rooted in custom to be easily ignored. The Provincial
Government of Trèves found itself apparently in a
region of measures higher than the Roman standard,
and, following the usual Roman habit, adopted it.

I think that the annexed diagrams will explain how
the Greek aroura and plethron fit, so to speak, into
Roman measures. (Figs. 68 and 69.) They will also
show the relation of the furrows of the Normandy
and British half-acres respectively to the side of the
Roman sors and the diagonal of its square and the
relation of the sors itself to the Greek aroura. The

square of fig. 68 is of 4 *Greek arouræ.*   The side is half
the furrow of the statute acre and its diagonal is the
furrow of the half-acre in form of 1×10.

The square of fig. 69 is of 4 *Roman sortes.*   The
side is the furrow of the British half-acre in form
of 1×10 ; and its diagonal is the furrow of the British
statute acre, in its usual 1×10 form.

These remarkable relations of the Normandy acre

Half the furrow of the statute acre

*Greek aroura
of 100 × 100
Greek cubits of
2 natural feet*

Half the furrow of the Normandy acre
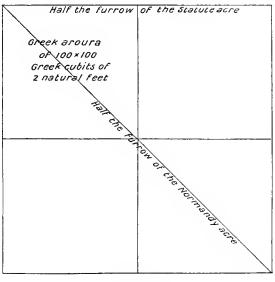
Fig. 68.

and British half-acres (1×10) cannot be accidental.
Had the standard used been the Roman one, whether
of Greek or Roman origin, the British acres would
have followed on the lower standard.   But it was
not so, the Roman foot had to be raised to meet a
probably existing higher standard ; and the *forest
acre* in the same way had to be raised to the enlarged
area of the Roman sors to meet local long-established
custom.

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Whence did the higher standard come ?

However imperfect our information of Central and
Eastern Europe may be, the broad fact was apparent
that in the region of the rival stunde or parasang
not only was the stade itself of higher standard and
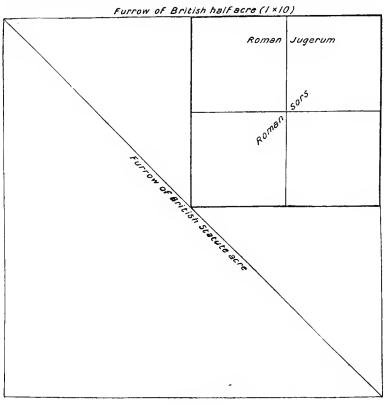
FIG. 69.

tending apparently to become of higher standard
still, but the *medimnus* of which the acres were mostly
multiples was also of excessive standard. We noticed
that at the same time in the Baltic region the contrast
in standard was as clearly marked as in the Breton.

The acres were no longer multiples of the medimnus but of the corn-land modius of as low a standard as the Irish acre of 2 stade acres, and even still lower.

What movements of population may have caused the passage westward of the acres of higher standard, whether the pressure may have been of Brythonic over Goidelic races, I shall not venture to suggest. But as regards Armorica, the facts remain for anyone to examine for himself not only of the separate existence side by side, or one on the top of the other, of acres of the two standards, but also of the gradual preponderance of the higher standard, especially in the case of the Normandy acre and its British half-acres, as they are found in the act of crossing the Channel. For in spite of the general higher standard of both Normandy acres and British half-acres there are traces here and there of the earlier prevalence of the lower standard, but we must not forget the legitimate variation in natural feet, &c., and so strain the test of the standards unduly.

The setier of the Chartrain, for instance, was a British half-acre of 39·629 ares instead of 40·85, and several other similar cases might be quoted. On the other hand, other instances occur of acres, belonging to the Breton lower standard group, being raised in standard as they come geographically under the influence of the higher standard. Still, on the whole, it will be difficult not to regard the Normandy acre and British statute acres as interlopers bringing with them the higher standard into a region once very possibly of the lower standard.

We turn now to the Breton agricultural units of the *lower* standard of natural measures.

Quite consistently with the general conclusion as to the common substratum of custom over the wider area of North and South Gaul, we have to pass both in Armorica and Britain from the region of the higher to that of the *lower* standard of natural measures.

As already suggested, it may perhaps be possible to discriminate by the test of standard between two more or less separate subsidiary currents of influence.

In the agricultural units of the maritime districts of Spain, indications appeared of approach to similarity to the Breton arpent both in formation and area and standard.

The Breton arpent, as we have seen, seems to have sprung rather from the Egyptian khet and Greek medimnus than from the Greek aroura and Roman jugerum. The Breton furrow was three lengths of the side of the khet. The length of the side of this Egyptian unit, as described by Dr. Griffith and Professor Petrie, was 100 Egyptian cubits or 52·4 m., and three times this equalled 157 m. The furrow of the Breton arpent was 156. The side of the khet was one-thirtieth and that of the Breton furrow one-tenth of the diagonal of the square leuga of lower standard. We found these figures in use in the customary itinerary measures of the lower Danubian district which were based on the diagonal of the leuga, and were multiples of the side of the khet.

The Breton arpent was of the same area as the Cornish acre, the furrow of which was $\frac{1}{10}$ of the leuga of lower standard. We noticed further that the Cornish gad or goad of 2·75 m. (8×80 of which made the acre and which was the decempeda of the *vorsus*-unit foot) entered into the measurement of a series of other British

acres showing that they belonged to a common system. Moreover, they are based upon the *lower* standard of the leuga, of which their furrows were divisions. They were in fact the British counterparts of the Calvados acres of lower standard. These acres had adhered to the lower standard notwithstanding their change of form in crossing the Channel.

Moreover, these acres of lower standard measured by the Cornish gad of 2·75 m. were mostly prevalent in the western and most pastoral and tribal region of Britain, whilst the statute acre seemed to have spread over that eastern and central portion of England which, according to Gallic tradition as reported by Cæsar, had received a strong infusion of Belgic emigrants who claimed that they had introduced agriculture into Britain. In this agricultural rather than tribal and pastoral portion of the island it is probable that *settled villages* with their open fields around them were already established, whilst in the western region of the acres of lower standard tribal and dominantly pastoral methods still prevailed, such agriculture as pastoral conditions required being carried on by ' co-aration of the waste ' and the eight-oxen plough—the length of the furrow being a twelfth, or a tenth, or an eighth, or a sixth of the leuga of lower standard, as the case might be.

There is another fact which may have a meaning in distinguishing the two pairs of acres. The leuga being the common itinerary measure in both cases it is curious to notice how in the case of the Breton and Cornish acres it is the furrow of the *Cornish* acre that is directly the tenth of the leuga and the Breton furrow that is a tenth of the half-diagonal of the square leuga ; whilst

in the case of the Normandy and British statute acres the change is reversed. It is the Normandy furrow that is directly the eighth of the leuga and the British furrow that is the eighth of the half-diagonal.

Whether any or what inference might ultimately be drawn from these singular facts I know not. Whether pressure westward of the higher standard may have had any connection or not with the supposed displacement of a Goidelic by a Brythonic people long before the Roman occupation of Gaul and Britain I dare not argue. The two languages were, after all, so nearly related that it is hard to think that the displacement of one by another can have represented a great movement of population.

But whatever the movement of races may have been, whether amounting to anything like a continuous immigration or conquest in proportion to the amount of pressure inwards and displacement, it might well have resulted in a counter-movement—in an overflow of forced *emigration* of the older race from Western Britain into Brittany, something like what happened under the stress of Saxon invasion.

The reversal of the change to a shorter furrow might then possibly in some mysterious way that one cannot understand mark the direction of the line of ingress and egress involved in a simultaneous movement of population into and out of the island.

I confess that I should be more interested if light could be thrown upon the movements and pressure of population which seem necessary to account for the close relationship between the British and Breton peoples already existing before Cæsar's invasion. The common possession of the peasantry on both sides of the

Channel of the remarkable group of acres under consideration does not stand alone. It is but one indication of the possession of common traditions. In their common maritime skill, in their concerted action when in danger, and even in the more or less vague recognition of the importance of Britain—as well as of Chartres—as an ancient centre of a common Druidical religion there surely is indication that under cover of a substantial identity of race and language they had long been closely related. All these things confirm the evidence of the acres that the closeness of their intimacy was not severed by the Channel between them.

These are not matters, however, which can be dealt with further in this chapter, and once more I beg the reader to make due distinction between the facts and any suggested inferences from them. The mention of the latter may, however, not have been irrelevant to the point under consideration, viz.—whether the influences which moulded the agricultural traditions of Brittany and Western Britain may not go back to different and perhaps even earlier sources than those which affected the agricultural measures of the Belgic district of Gaul and of Eastern Britain.

Turning once more to the specially British aspect of the problem, and crossing the Channel with the suspicion that the higher standard of the Normandy and British statute acre was an intrusion into what may have been originally a country of lower standard, the temptation can hardly be resisted to follow the clue of Roman influence from Gaul into Britain. Why else should the furrow of the acre which became the *Scottish acre* be raised in Scotland from the

Cornish length of 219 or 220 m. to 226 m. and 228 m. unless indeed to raise its area to the higher standard of the exaggerated Roman sors ? Or to put the point in a still more direct way, how are we to account for the similarity in area between the Scottish (1 × 10) acre and the French forest acre in a square, both of which we have seen to be equal in area to the Roman sors *raised to an exaggerated standard by raising the Roman foot from* ·2955 *to* ·298 m. The area of the French forest acre in a square was 51·072 ares and that of the Scottish acre is reported to be 51·423 in a 1 × 10 form.

The facts regarding this Scottish acre are suggestive.

Its prevalence both in Ayrshire and Ulster, thus forming a connecting link between the Scottish and Irish portions of *Dalriada,* and leaving to this day the *Cunningham* acre with its furrow of 228 m. as the customary acre of East Ulster of similar area and form, cannot be overlooked. It seems to carry its presence back to the sixth century and to touch a real movement of population.

It is again a curious fact that dealing with a Scottish customary acre which is really of the *Cornish type,* but with exaggerated furrow, we should find the district where it was present in Scotland occupied according to Ptolemy by a tribe of the *Damnonii,* by whom so much of the Cornish peninsula was also occupied.

Mr. Skene, without thought or knowledge of the similarity in acres, seems to accept the presence of a ' *Cornish element* ' involved in the tribal name, without hesitation, on Ptolemy's authority.

Speaking of the ' Kingdom of the Britons ' of Alclyde after the departure of the Romans he writes [1] :—

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[1] I. 236.

The population of this Kingdom seems to have belonged to the two varieties of the British race—the southern half including Dumfriesshire, being Cymric or Welsh, and the northern half having been occupied by the *Damnonii* who belonged to the Cornish variety. . . . The Kingdom of the Britons had at this time no territorial designation, but its monarchs were termed Kings of *Alcluith* and belonged to that party among the Britons who bore the peculiar name of Romans and claimed descent from the ancient Roman rulers in Britain.

In another place [1] he speaks of ' *the great nation of the Damnonii extending as far North as the river Tay* . . . They possessed 6 towns—three south of the Firths and three north of them.' And again: [2] ' The fertile plains from the Tay to Galloway were entirely possessed by one great tribe, the *Damnonii*.'

He speaks [3] of the Roman Wall between the Firths of Forth and Clyde as constructed through the heart of the territories of the Damnonii, thus dividing the nation into two parts, one of which was included within the province and subjected to Roman government, while the other remained beyond the boundary of Roman Britain ; three of the towns mentioned by Ptolemy being within the province and the other three north of the wall.

The existence of this tribe of the *Damnonii* in the North is accepted by Elton as well as by Skene, though probably neither of them knew, as certainly Ptolemy did not, that the Cornish acre seems to have followed the Damnonian name, though with an exaggerated furrow and area, accounted for possibly by Roman surroundings.

Thus, following the evidence of the acres in confirmation of what Mr. Skene arrived at from quite other evidence, the acres seem to have passed through

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[1] I. 72.   [2] p. 127.   [3] p. 128.

the Roman period like the leuga unchanged, except in standard, and landed, so to say, in a most unexpected combination of customary acres side by side in the district which, having been the very centre of the struggle of the Romans with the Picts and Scots, had become so fully Romanised that on the Roman departure it formed a new Romano-British centre of influence from which came the Cumbrian invasion of Wales by ' *Cunedda and his sons* ' with semi-Romanised usages and notions. What customary acres do we find left still on this classical ground ? (1) The Cornish acre of Dalriada has become, with an exaggerated furrow of 226 m., the prevalent Scottish acre to this day. (2) The strangely contrasted so-called *Irish acre,* with its area of two stades of *very low* standard still clings to the Yorkshire and Cumberland hills and extends in Lancashire as far as the Ribble.

Where else do we find this curious proximity of these customary acres ? We have already seen that the Dalriada and Scottish acres are exaggerated and perhaps Romanised Cornish acres. But where shall we find the so-called Irish acre ? We have seen that it lies in the form of a square, but with a remarkable identity of area *as a double stade acre in the land of the Pictones* side by side with the Brittany arpent. Shall we find once more in the similarity of name and of the area of the Irish acre evidence of tribal movement of a portion of the Pictish tribe from the mouth of the Loire up the Irish Sea to the scene of the warfare which cost the Romans so much and made the region of the walls the limit of the Empire ?

I dare not offer a suggestion. It is enough to have mentioned the fact.

In concluding this chapter there is, I think, a lesson to be learned, for which this remarkable Scottish acre might well be taken as the text.

We have spoken many times of the substratum of common agricultural custom underlying these customary acres. But *where* does it lie ? It cannot be the result merely of lines of commerce or intercourse passing over the surface of the common substratum. We have suggested that it must, so to speak, represent the stage of agricultural advance already reached in the course of evolution by the population of Western Europe, a common possession brought with them in their wanderings or learned from one another during ages of occupation of the country in which they are found permanently settled.

But besides the common substratum of civilisation of Western Europe as a whole, there are distinct traditions belonging to particular tribes just as in the case of the *Damnonii,* if the recurrence of the name in Ptolemy's map in Scotland as well as in West Wales may be trusted. Why did the tribe take the Cornish acre with them when an offshoot of them moved from the Cornish peninsula to found a new detachment of their tribe in Scotland ? All we can say is that the force of custom seems to have been strong enough in the case of the customary acres of Britain and Armorica to account for it.

From these cases of frequent emigration of tribal offshoots, bearing with them their old tribal name and their customary acres we seem to learn the further lesson that above the substratum of common traditions in Central and North-Western Europe there was a tribal independence and restlessness which was a

feature of tribal conditions not to be overlooked. The fact that Cæsar found a portion of the *Helvetii* on the move right across Gaul to the land of the Santones at the mouth of the Garonne is a striking case in point. It must confirm as well as throw light on Ptolemy's instances of emigration of offshoots of the tribes carrying their tribal name with them into new geographical positions. Whether this can have any bearing upon the problem of the remarkable similarity in the customary acres of the Veneti of Brittany and the Veneti of the Po Valley, I dare not venture an opinion.

Finally, coming back to the intention adhered to throughout this inquiry to keep the facts regarding the acres distinct from inferences from them, let not the reader think for a moment that the substratum of common tradition so often alluded to was confined to the acres. It doubtless contained a thousand other elements with a long past behind them gathered up in the experience of life and the course of economic evolution. The study of the British and Armorican group of acres is but one line of inquiry separately followed, because the time has not come yet for generalisations which become legitimate only when the facts of each separate line of inquiry have been sufficiently examined on their own evidence.

So by the labours of many fellow-workers may we hope some day to understand better than we do what is involved in the toilsome path which humanity has had in the past and it would seem has still to tread towards the goal of civilisation—the art of living together in civilised society.

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